The EDISON ELECTRIC INSTITUTE BULLETIN

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July
1955

EEI CONVENTION ISSUE

Harold Quinton
R. G. Rincliffe
James B. Black
Richard Joyce Smith
Kinsey M. Robinson
C. A. Tatum, Jr.
H. C. McClellan
Elmer L. Lindseth
Philip A. Fleger
Edgar H. Dixon
Louis V. Sutton
Philip Sporn

Dr. George C. S. Benson

Published Monthly by Edison Electric Institute

ELECTRICAL RESEARCH STATISTICS
THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

(Includes Investor-Owned Companies, Cooperatives, and Government-Owned Utilities)

March, 1954-1955

SOURCE AND DISPOSAL OF ENERGY—MONTH OF MARCH

	1955	1954	%
NET GENERATION* (Kwhrs in Thousands)			
By Fuel Burning Plants	34,050,693	28,997,663	+17.4
By Water Power Plants	10,398,734	9,920,793	+ 4.8
Total Generation	**44,449,427**	**38,918,456**	**+14.2**
Add—Net Imports Over International Boundaries	304,092	69,249	.....
Less—Company Use	130,604	124,223	+ 5.1
Less—Energy Used by Producer	1,185,253	670,831	+76.7
Net Energy for Distribution	**43,437,662**	**38,192,651**	**+13.7**
Lost and Unaccounted for	5,154,465	4,988,186	+ 3.3
Sales to Ultimate Customers	**38,283,197**	**33,204,465**	**+15.3**

CLASSIFICATION OF SALES

NUMBER OF CUSTOMERS—As of March 31			
Residential or Domestic	43,439,370	42,150,691	+ 3.1
Rural (Distinct Rural Rates)	1,605,014	1,621,465	− 1.0
Commercial or Industrial:			
Small Light and Power	5,962,178	5,873,666	+ 1.5
Large Light and Power	276,655	272,545	+ 1.5
Other Customers	167,088	160,272	+ 4.3
Total Ultimate Customers	**51,450,305**	**50,078,639**	**+ 2.7**
KILOWATTHOUR SALES—During Month of March			
Residential or Domestic	10,374,562	9,263,242	+12.0
Rural (Distinct Rural Rates)	719,257	663,371	+ 8.4
Commercial or Industrial:			
Small Light and Power	6,268,548	5,668,390	+10.6
Large Light and Power	19,253,294	16,008,448	+20.3
Street and Highway Lighting	370,518	341,627	+ 8.5
Other Public Authorities	830,406	767,652	+ 8.2
Railways and Railroads:			
Street and Interurban Railways	236,858	252,252	− 6.1
Electrified Railroads	178,785	191,931	− 6.9
Interdepartmental	50,969	47,552	+ 7.2
Total to Ultimate Customers	**38,283,197**	**33,204,465**	**+15.3**
Revenue from Ultimate Customers (Thousands)	**$651,058**	**$589,852**	**+10.4**

RESIDENTIAL OR DOMESTIC SERVICE

AVERAGE CUSTOMER DATA—For 12 months ended March 31, 1955			
Kilowatthours per Customer	2,606	2,400	+ 8.6
Average Annual Bill	$69.84	$65.28	+ 7.0
Revenue per Kilowatthour	2.68¢	2.72¢	− 1.5

* By Courtesy of the Federal Power Commission.

THE EDISON ELECTRIC INSTITUTE BULLETIN is published monthly by the Edison Electric Institute, an association of electric light and power companies in the United States and its territorial possessions. Its affiliate members consist of members of the Canadian Electrical Association.

The objectives of the Edison Electric Institute are:

The advancement in the public service of the art of producing, transmitting, and distributing electricity and the promotion of scientific research in such field.

The ascertainment and making available to the members and the public of factual information, data, and statistics relating to the electric industry.

To aid its operating company members to generate and sell electric energy at the lowest possible price commensurate with safe and adequate service, giving due regard to the interests of consumer, investor, and employee.

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Closing date for the BULLETIN is the tenth of the month preceding the month of issue.

Manuscripts and correspondence relating to the BULLETIN should be addressed to the Editor, Edison Electric Institute, 420 Lexington Avenue, New York 17, N. Y.

The Edison Electric Institute does not assume responsibility for, nor necessarily endorse or approve, statements made by contributors to the BULLETIN.

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Subscription price of the BULLETIN is $2.00 per year in the United States; $3.00 per year in foreign countries.

Entered as second-class matter, August 17, 1933, at the post office at Philadelphia 2, Pa., under the act of March 3, 1879. Publication office, 56th and Chestnut Sts., Philadelphia 39, Pa. Editorial office, 420 Lexington Ave., New York 17, N. Y. Volume 23, No. 7, 1955.

The EDISON ELECTRIC INSTITUTE BULLETIN

July, 1955

Vol. 23 No. 7

Articles, Speeches, Reports

Confidence in Future, Realistic Comprehension Combined in 23rd Annual EEI Convention 195

Remarks of Harllee Branch, Jr., in Accepting Presidency of Edison Electric Institute 198

The President's Address
Harold Quinton 201

Texas Power & Light Co. Wins Charles A. Coffin Award 207

Super-Critical Pressure—An Essential Forward Step in Power Generation—*R. G. Rincliffe* 208

Far Western Growth Makes Utility History
James B. Black 213

Competing Agencies of Regulation—A Reappraisal
Richard Joyce Smith 218

Electric Utility Problems in the Pacific Northwest
Kinsey M. Robinson 222

Air Conditioning Is Big Business
C. A. Tatum, Jr. 227

Inter-Dependence of Free Enterprise
H. C. McClellan 230

Let's Go Into Action
Elmer L. Lindseth 233

The Shippingport Atomic Power Plant
Philip A. Fleger 235

Industry's Response to Nuclear Power
Edgar H. Dixon 238

Our Record Will Win Public Support
Louis V. Sutton 241

Movement of Power
Philip Sporn 245

Is the Federal Government Taking Over the States?
Dr. George C. S. Benson 252

News, Notes, Miscellany

Seasonal Hazards Material Available 217

Christmas Gift Promotion 232

William F. Moses Wins Management Award 254

Conventions and Meetings 256

HARLLEE BRANCH, JR.

Newly Elected President of the Edison Electric Institute

The EDISON ELECTRIC INSTITUTE

BULLETIN

Confidence in Future, Realistic Comprehension Combined in 23rd Annual EEI Convention

RANKING as one of the most productive and stimulating meetings in electric industry annals, and the largest Institute gathering ever held away from the East Coast, the 23rd Annual EEI Convention attracted over 2,200 delegates and guests to Los Angeles for the four-day program, June 13-16.

Confidence in electric company abilities to meet future challenges, combined with a realistic comprehension of the scope and significance of problems to be faced, was a principal theme. Authorities on various phases of the industry offered talks which constituted a sound stock-taking and up-dating in such important areas as atomic development, advances in conventional power supply techniques, regulation, and relations with both national and local governmental bodies.

President's Statement to Press

In a statement to the press on the eve of the Convention, Institute President Harold Quinton summed up the general feeling of the meeting by saying, "the investor-owned electric industry today is strong, progressive and backed by the greatest reservoir of public confidence we have ever had. In our advances on the frontiers of the future, we intend to do our best to enhance these assets."

The formal program opened on Monday afternoon, June 13, with an address of welcome by Hon. Goodwin J. Knight, Governor of California. Hon. Norris Poulson, Mayor of Los Angeles, added his good wishes at the session on Tuesday morning. Speaking on the five general sessions of the Convention were 16 widely recognized leaders in business and professional fields. Their addresses are included in this issue of the BULLETIN, with the exception of two which will appear next month.

An additional feature of the program, occurring on Monday afternoon, was the presentation of a preliminary report, illustrated with slides, on "Operation Cue," the recent atomic test in which EEI participated.

OFFICERS OF EEI

HARLLEE BRANCH, JR., *President*
Georgia Power Company
Atlanta, Georgia

D. S. KENNEDY, *Vice President*
Oklahoma Gas & Electric Company
Oklahoma City, Oklahoma

H. S. BENNION, *Vice President and Managing Director*
420 Lexington Avenue
New York 17, New York

H. S. SUTTON, *Treasurer*
Consolidated Edison Company of New York, Incorporated
New York, New York

A. B. MORGAN, *Secretary and Assistant Managing Director*
420 Lexington Avenue
New York 17, New York

Election of Officers

Harllee Branch, Jr., President and Director of Georgia Power Co., was elected President of the Institute at the Convention, succeeding Mr. Quinton. He was installed as the new EEI chief executive at the final session on Thursday morning.

Mr. Branch led the delegates and guests in a vote of thanks to Mr. Quinton for his conscientious and inspiring leadership in the industry during the past year. Also paying tribute to the superlative cooperation of the Southern California Edison Co. organization in handling plans, preparations and operation of the Convention, Mr. Branch noted that an "honor roll" of the host company's convention workers would be a very long one, and he called upon George N. Hawley, Southern California Edison Vice President, and chairman of the company's EEI convention planning committee, to accept the industry's gratitude for everyone in his organization.

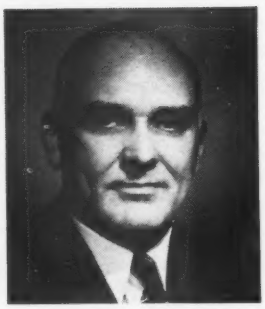
The incoming President then outlined goals towards which the Institute would work in the coming months. His remarks appear on page 198.

Elected as Institute Vice President was Donald S. Kennedy, President and Chairman of Oklahoma Gas & Electric Co. Harold S. Sutton,

New Members of the EEI Board of Directors

J. L. BATES
President, Central Power & Light Co.

A. M. BEEBEE
President, Rochester Gas & Electric Corp.



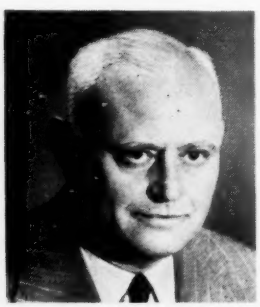
F. D. CAMPBELL
President, Cambridge Electric Light Co.

C. B. DELAFIELD
Vice President, Consolidated Edison Co. of New York, Inc.

R. H. FITE
President, Florida Power & Light Co.

R. H. GERDES
Executive Vice President & General Counsel, Pacific Gas & Electric Co.

N. B. GUSSETT
President, Iowa Power & Light Co.



E. L. LINDSETH
President, The Cleveland Electric Illuminating Co.

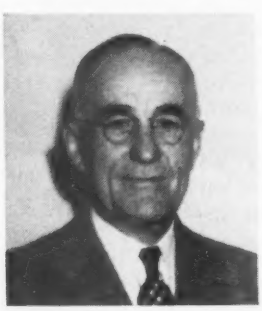
D. C. LUCE
President, Public Service Electric & Gas Co.

M. S. LUTHRINGER
President, Central Illinois Public Service Co.

C. E. OAKES
President, Pennsylvania Power & Light Co.

H. T. PRITCHARD
President, Indianapolis Power & Light Co.

K. M. ROBINSON
President, The Washington Water Power Co.



L. M. SMITH
President, Alabama Power Co.

HAROLD TURNER
Exec. Vice Pres., American Gas and Electric Co.

NEW PRESIDENT OF THE INSTITUTE

HARLLEE BRANCH, JR., President and Director of Georgia Power Co., Atlanta, has been elected President of the Edison Electric Institute by its Board of Directors. Installation of the new President was made on June 16 at the closing session of the Institute's 23rd Annual Convention. Vice President of the Institute for the past year, Mr. Branch succeeds Harold Quinton, President of the Southern California Edison Co., as Institute President.

Noted in the electric utility industry for his qualities of dynamic leadership, Mr. Branch is one of the youngest Presidents the Institute has had. Born in Atlanta on June 21, 1906, he recently celebrated his forty-ninth birthday.

Active interest in community progress is characteristic of both Mr. Branch and the company he heads. Georgia Power is well-known throughout the nation for its "Better Home Towns" program and for other successful area and industrial development activities. One of the leading electric utilities in the South, Georgia Power has expanded rapidly in the last decade. Customers at the end of 1954 totaled more than 553,000, an increase of 88 per cent over 1945, and electricity sales reached more than 6½-billion kilowatthours, nearly 138 per cent above the 1945 figure.

The company's service area covers 49,700 square miles, nearly the entire state of Georgia, and its 8 steam-electric plants and 21 hydroelectric plants have a total generating capacity of 1,344,000 kilowatts.

After completing his early education in the Atlanta schools, Mr. Branch went on to Davidson College in North Carolina, receiving his B.A. degree in 1927. In that year, he entered Emory University as a law student, and was graduated in 1931.

He had been a member of the law firm of MacDougald, Troutman, Sams and Branch, of Atlanta, general counsel for Georgia Power, for 18 years when he was called to the vice presidency and general managership of the company in 1949. Early in 1951 he was elected to the presidency.

Mr. Branch is also a director of The Southern Company and of Southern Services, Inc. In 1953 he was appointed a director of the Federal Reserve Bank of Atlanta and now serves as Deputy Chairman of the Board of that institution.

Mr. Branch has been a keen and energetic participant in the educational, cultural, and service concerns of his community. He is a former trustee of the Atlanta Community Chest and was general chairman of its 1950 fund-raising campaign. He is a director of the Atlanta Chapter of the American Red Cross, a director of the YMCA Council of Georgia, of Junior Achievement of Georgia, Inc., and of the Georgia 4-H Club Foundation. He is a member of the Executive Committee of the Atlanta Conference of Christians and Jews and of the Advisory Board of St. Joseph's Infirmary. Mr. Branch is a member of the Board of Trustees of Emory University, of the Georgia Tech Research Institute, and of the Columbia Theological Seminary. He also serves as a trustee of the Atlanta Art Association and the Atlanta Symphony Guild, and is a former President of the Davidson College Alumni Association. He served as a lieutenant in the U. S. Navy during World War II.

He is immediate past president of the Southeastern Electric Exchange, a former president of the Atlanta Bar Association and of the Atlanta Legal Aid Society. Among the other organizations to which Mr. Branch belongs are: President's Council of American Institute of Management; Policy Committee of U. S. Chamber of Commerce, and Atlanta Rotary Club.

Treasurer of Consolidated Edison Co. of New York, Inc., was re-elected Treasurer of the Institute, and 15 member company executives were named to the EEI Board of Directors.

Col. H. S. Bennion, Institute Vice President and Managing Director, and A. B. Morgan, Institute Secretary and Assistant Managing Director, were re-elected to their posts.

Prize Awards

At the Tuesday afternoon general session, the Reddy Kilowatt Annual Report Award and the Claude L. Matthews Valor Award were presented in ceremonies presided over by Harry Restofski, Vice President of West Penn Power Co., and Chairman of the EEI Prize Awards Committee.

Before conducting the presentations, Mr. Restofski reported on the EEI Medal Awards, given for successful resuscitation from electric shock; the EEI Safety Merit Awards, based on accident-free operation for one million consecutive man-hours; and the EEI Accident Frequency Reduction Award. Results in these categories showed an encouraging trend in industry safety consciousness and practice.

Referring to the seven commercial awards presented annually at the EEI Sales Conference in Chicago, Mr. Restofski said that details of changes making for quicker and easier preparation of entries would be sent out to companies soon. Noting that the Committee hopes that even more companies will join the ranks of those competing, the Chairman said, "The awards themselves are not the ultimate aim—if you enter one or more of the contests, you just can't lose, because your company and your employees will benefit greatly from the stimulus of entering and sharing entry material with other companies doing similar promotions."

The Reddy Kilowatt Annual Report Award is sponsored every year by Reddy Kilowatt, Inc., and presented to the company whose annual report best simplifies, dramatizes and humanizes company operations. The award, consisting of a bronze plaque, was won by New York State Electric & Gas Corp. William A. Lyons, Vice President, accepted the plaque on behalf of his company.

Remarks of Harllee Branch, Jr., in Accepting Presidency of Edison Electric Institute

I AM most appreciative of the great honor which you have bestowed upon me in electing me to the presidency of the Edison Electric Institute. I am particularly grateful because of the confidence you have shown in a member of your organization who has had only a relatively short period of service in the electric utility industry. I shall endeavor to show my appreciation by doing everything in my power to assist in carrying forward the constructive programs and useful work of the Institute.

The object of the Institute is to assist its members, through research, development and the gathering and free exchange of information, to achieve continuous improvement in the equipment and methods for supplying electric service. The remarkable advances in these fields in recent and earlier decades proves that the Institute, its member companies, and our friends in the manufacturing branches of the industry have capably done their jobs. The present rate of progress indicates that they will continue to do so.

As your president, I shall endeavor to promote within and without our membership a better understanding of the industry's basic interests and concerns. I shall do this not only to assure our industry's continuing progress, but also because I am firmly convinced that the interests of our industry coincide with the best interests of our nation and all of its citizens.

The Institute is our industry's most important association. In this organization, the leaders of the industry come together to increase their knowledge and appreciation of conditions, favorable and unfavorable, confronting the investor-owned and tax paying electric utilities in all sections of the nation. Here we reconcile and minimize conflicting views and interests, here we give to each other that mutual understanding and help necessary to keep us moving forward as a unit in our service of the public. Here also the younger leaders of our industry, those who will be heading our companies in another ten or fifteen years and making the policies and guiding the destinies of our industry, come together to be instructed and stimulated and to have their sights lifted so that they may glimpse the road ahead with all its promise and all its challenge.

Because our industry supplies an essential service, the leaders of our business have an opportunity to enhance the standing of the free enterprise system beyond that of almost any other representatives of American business. This imposes upon us a duty to manage our own businesses with decency and efficiency, to speak courageously against any individual or group who would impair our American way of life, and to see that our citizens are fully and correctly informed regarding their economic as well as their political rights and liberties.

It will be my purpose in the office to which you have elected me, to protect with vigor the interests of the free enterprise system in general and of our industry in particular. We are living in a time when names and labels are mischievously and grievously misused. There are those who proclaim themselves to be devoted to the free enterprise system and yet support Federal power and other socialistic projects where private capital is fully able and willing to go ahead. These are not friends of free enterprise. They are enemies who betray it. I shall, as your spokesman, vigorously oppose them by every proper and rightful means.

In difficult times it is important to get down to fundamentals to be sure we are following sound lines of thought and action, both individually and collectively. That is why we need to meet frequently. But our job does not end when we verify our own thinking. We must acquaint our business associates, our political leaders, and the public generally with our work, our problems, and the needless and unfair handicaps under which we are too often forced to operate. These are the ways in which we can best serve our industry and the nation.

As representatives of the electric industry, we must achieve a greater degree of coordination, a more united front, in our attitudes toward public issues and a greater degree of articulateness in presenting our case to the American public. In thanking you for your friendship and confidence, I would like to express the hope that our companies, individually and collectively, will become more and more useful servants of the American people and thereby increase our stature as an essential part of the nation's economic and social order.

Four other electric companies received certificates in separate categories for their annual reports. Winner among companies with 400,000 or more customers was Pennsylvania Power & Light Co.; Arkansas Power & Light Co. won in the 200,000-400,000 customer classification; Interstate Power Co. was first in the 100,000-200,000 customer group; and Nova Scotia Light & Power Co. won first place among companies with less than 100,000 customers. Ashton B. Collins, President of Reddy Kilowatt, Inc., made the presentations.

The Claude L. Matthews Valor Award honors acts of devotion to duty where extraordinary courage is exercised to maintain important electric service or to restore service in the shortest possible time.

Winning the Valor Award for 1954 was a 10-man Kentucky Utilities Co. generating station crew, whose bravery and quick action in the face of live steam and scalding water from a broken boiler feed line prevented a catastrophe which would have caused a serious power shortage in the company's service area for days.

The feed-line break came at 5:25 a. m. last December 29th, when all

three generating units of Kentucky Utilities' 120,000-kw Green River Power Plant were carrying full load. Each member of the operating crew, in the words of the award citation, "took prompt, considered and courageous action, without regard for personal safety, to prevent further disaster and to maintain service" to the utility's customers.

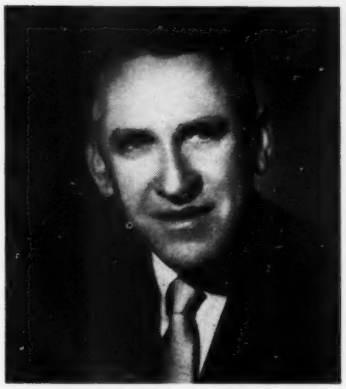
"In complete darkness," the citation continues, "under extremely hazardous conditions which necessitated crawling from post to post through hot water, under a near-suffocating blanket of steam, these men carried out flawlessly the intricate tasks required to prevent further damage to the two generating units directly affected, and maintained in continuing service the third unit, which represents half the plant's total capability.

"Within 30 minutes after the feedline failure, effective emergency measures had been completed, and it was therefore possible to have the entire plant operating again within eighteen hours." The citation concludes, "Through their resourceful thinking and their excellent teamwork, exemplifying the highest traditions of electric utility public service, this operating crew held both the damage and outage to a minimum, averting a serious power shortage on the entire Kentucky Utilities Co. system."

Paul Compton, shift engineer, represented the crew at the presentation ceremony, receiving a certificate and medal from the donor, Claude L. Matthews, Vice President of A. B. Chance Co. The other members of the crew, also receiving awards, were: David Shaver, Sam Browning, and James B. Compton, assistant shift engineers; Norris E. Ford and Charles E. Lear, auxiliary operators; and Jewell McDonald, Charles Gossett, William Armstrong, and James B. Moore, boiler operators. The occasion marked the fourth time that Kentucky Utilities personnel have won the Valor Award.

At the 23rd Annual EEI Convention Harold Quinton (left), confers with his newly elected successor as President of the Institute, Harllee Branch, Jr., (center) and H. S. Bennion, who was re-elected Vice President and Managing Director.

Donald S. Kennedy Is Elected Vice President of Edison Electric Institute



DONALD S. KENNEDY, President and Chairman of the Board of Oklahoma Gas & Electric Co., was elected Vice President of the Edison Electric Institute at its 23rd Annual Convention. Mr. Kennedy succeeds the Institute's new President, Harllee Branch, Jr., in the vice presidential post which he will fill for one year.

A leading electric company executive from the Southwest, Mr. Kennedy has made his career with Oklahoma Gas & Electric, which he joined following his graduation from the University of Arizona in 1923. Starting in with OG&E as a bookkeeper, in Oklahoma City, he soon became a traveling auditor. In 1928, he became auditor for the company's Eastern Division, returning to Oklahoma City in 1940 as assistant to the treasurer. Two years later he was elected vice president, treasurer, and a director.

In 1947 Mr. Kennedy became executive vice president. He was elected to his present post in 1949.

Among his many business and civic activities, Mr. Kennedy serves on the Board of Directors of the YMCA, the First National Bank and Trust Co. of Oklahoma City, Oklahoma State Fair, and Oklahoma City Symphony Orchestra. He is past president of the Oklahoma City Chamber of Commerce.

Special Events

For most of those in attendance, the entire Convention could be classed as a "special event." There can be little doubt that the attractiveness of the Southern California setting helped to influence electric industry people from every part of the country to make the journey, and the glamor of Hollywood and near-by resort areas must have had something to do with the unusually high proportion of ladies present.

Although the sun was more than discreet in its appearances during the Convention, neither "smog" nor rain interfered with any of the scheduled activities. And the atmosphere of enthusiastic cooperation and friendliness engendered by the people of Southern California Edison in arranging everything from special trips and transportation to emergency stenographic facilities provided the most hospitable climate imaginable.

The first opportunity on the pro-

Harry Restofski (right), Chairman of the EEI Prize Awards Committee, presides at presentation of Reddy Kilowatt Annual Report Awards, donated by Ashton B. Collins (third from left), President of Reddy Kilowatt, Inc., to (l. to r.) Everett L. Palmer, Pennsylvania Power & Light Co., Herman T. Smith, Nova Scotia Light & Power Co., Ltd., William A. Lyons, New York State Electric and Gas Corp., Robert J. Wimberley, Arkansas Power & Light Co., M. L. Kapp, Interstate Power.

gram for an informal get-together was the President's Reception, held on Monday evening at the Hotel Statler. On the following afternoon, the ladies at the Convention were guests of Southern California Edison on a tour of Universal Studios' motion picture lot.

On Wednesday, with the Institute as their host, the ladies went on a tour of Hollywood and Beverly Hills, which included on its route the homes of well-known film personalities. This was followed by luncheon at the outdoor Copa Club of the Beverly-Wilshire Hotel, where there was also offered for the ladies' delectation a fashion preview titled "Designing Californians" and a swimming and diving exhibition. President Quinton was on hand to extend a welcome, and Louise Bockman, noted fashion commentator, presided.

That evening, the Texas Power & Light Co. received the Charles A. Coffin Award in a ceremony conducted at the Paramount Theatre near Pershing Square. The award was presented to W. W. Lynch, TP&L

(*Continued on page* 255)

Winners of the Claude L. Matthews Valor Award, the 10-man crew from Kentucky Utilities Co. includes (seated l. to r.) William Armstrong, Jewell McDonald, Sam Browning, Charles E. Lear, James B. Moore, and, standing, David Shaver, Norris Ford, James B. Compton, Charles Gossett, and Paul Compton.

"ONCE THE ISSUES ARE CLEAR . . ."

Read — Remember — Repeat

. . . the more important Federal statutory provisions that call for correction are (a) the tax exemption granted governmental proprietary power businesses, (b) the preference privileges in the sale of Federal government power now enjoyed by certain electric customers at the expense of all others and (c) the needlessly costly and burdensome duplicate regulation by Federal government agencies on top of the regulation by state government agencies.

. . . bureaucratic powers must be hedged in by solid walls and not just marked by single posts which can be by-passed on either side and left standing far to the rear by the advance of Federal domination in the field of regulation . . . the problem must be dealt with on the fundamental principle of restricting duplicate regulation and overlapping jurisdiction to the absolute minimum.

. . . once the issues are clear we need have no fear of the outcome.

The President's Address

By Harold Quinton

President, Edison Electric Institute, and
President, Southern California Edison Company

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 13, 1955

IT would be reasonable to expect the President's address at the Annual Convention of the Institute to deal with the achievements of our industry, the statistics of its past growth, and expectations of future growth. I want to devote most of my attention, however, to personal observations on issues which confront our industry and our nation. Many of our companies have taken a stand on these matters; and while we are all familiar with that stand and I have been somewhat guided by it, the views I express are, as I've said, my own—arrived at after prayerful consideration of our mutual problems.

Notwithstanding their consistent and unmatched record in meeting soaring demands for electric service and in reducing prices in the face of a long and steep rise in costs, the electric utility companies find themselves today needlessly handicapped and burdened with provisions of law enacted during the past 35 years, that, in the best interest of their customers and of this country, should be corrected. Clearly, the duty devolves upon us, the managers of utility companies, to devote our serious and best efforts to assist in bringing about these needed corrections.

Briefly the more important Federal statutory provisions that call for correction are (1) the tax exemption

HAROLD QUINTON

granted governmental proprietary power businesses, (2) the preference privileges in the sale of Federal government power now enjoyed by certain electric customers at the expense of all others, and (3) the needlessly costly and burdensome duplicate regulation by Federal government agencies on top of the regulation by state government agencies.

As I see it, we have a long and arduous job ahead of us, to bring about this needed corrective legislation. It is never an easy, and generally a thankless task to revise statutes which afford special benefits to a certain privileged class, but electric utility companies serve some 40 million customers, or about 80 per cent of the total number for the nation, and are duty bound to strive to obtain the enactment of laws that are fair to the customers' present interests and that safeguard their future interests as well.

These customers have benefited enormously from the advances in our system engineering, and from developments in our commercial operations and business management. It is important to them that fair and sound legislation permit us to bring them the benefits that future advances in technology and good management can also realize. It is important that the attainment of the best fruits of free enterprise not be hampered or stultified by unfair and burdensome statutory requirements and administrative regulations and interpretations. Clearly, the past record of the electric utility companies gives every assurance to the nation that great strides forward will continue to be achieved if progress is not slowed or halted by unwarranted limitations imposed by government.

I speak here only of the best interests of the customer without mentioning the investor and his important relation to the matter, because the consumer is prone to lose sight of the fact that his best interest over the years is identical with that of the investor. Without the voluntary investor the consumer's economic

freedom would also shrivel and disappear. Our 40 million consumers need our nearly 4 million voluntary investors, and to have the use of their capital, the investors must be convinced they can reasonably count upon the safety of their investment and upon a fair return thereon. Investors understand this identity of interest, but many customers do not. It is important, therefore, that we, the utility managers, and our customers always clearly see that in struggling to obtain fair and wise Federal legislation we are working primarily for our customers and only secondarily for our investors.

Legislative History

It may be worth noting how some of the unjust and needlessly onerous legislation was placed on the statute books. Most of you can remember the legislative history of the decade of the thirties—the sweeping enactments profoundly affecting the operations of the electric power industry, many of which were passed by a very thin margin of votes. The full scope and designs of much of this legislation were certainly obscured to the management of utility companies, and must have been equally obscure to many of the members of Congress voting for the measures. Craftily phrased definitions and contradictory provisions placed in different parts of an act, apparently to meet the objections of members of Congress, provide a device whereby administrative agencies can choose their own interpretations and set their own limitations as they see fit. It was under such conditions that provisions placing heavy handicaps on many elements of the free enterprise system were established in the Federal statutes.

I feel certain that many of those voting for these Federal legislative measures had no notion of the extent and character of Federal ownership and control that would eventuate.

I am emphasizing the enactment, in a relatively short period, of sweeping provisions of law inimical to investor-owned businesses in order to picture the contrast between that legislative proceeding and what I believe will be required in time and effort to persuade the Congress to correct the more unjust and harmful provisions of that legislation. I feel it will be done bit by bit and may require two or more decades during which time there may be many setbacks and disappointments, but I feel deeply that the undertaking is an obligation we owe to our country and to our customers, as well as to the investors of the companies we manage. It is an important part of our share in the vital struggle for a healthy survival of the free enterprise system in this nation and in the world.

A Just Cause

Let us look for a moment at our limited forces and the means at our disposal for accomplishing this serious and important work. The electric utility companies have no significant political power or influence. They command no votes. They have relatively only a small number of employees and all of these, without equivocation, vote just as they see fit as American citizens.

Plainly, the case of the investor-owned companies rests on the best long-range interests of their customers and the public. Our appeal, therefore, must depend upon the wisdom, the good sense, and the sense of fairness and justice of the general public and of the committees of Congress who hear our arguments.

Actually, the position of the companies is inherently strong, positive, and just. Their opponents' position is inherently weak and defensive, for they argue for the preservation of unfair, special privileges that are harmful to broad public interest, and though they rarely will face it, they argue for a program that must eventuate in national socialism.

Problems Involved

The companies' first problem will be to get the public, along with its consideration of its immediate interests, to take into account its own broad and vital interests in the years ahead. Their second problem will be to prevent the beneficiaries of special privileges and those devoted to Federal government ownership of industry from succeeding in clever maneuvers to disguise the real issues, to confuse the public with false accusations and smoke screens and to divert the public's attention to minor or side issues, away from the fundamental issue of freedom for the individual. Special benefits to localities will be dangled before the public and before the Congressional committees. Our job will be to bring out and make clear the simple and grave, though disputed, fact that these immediate steps of our adversaries, however cloaked and rationalized, are, nevertheless, directed toward and must lead to the goal of national socialism. I use the word national instead of Federal because history clearly reveals that a federation of sovereign states would survive in name only if free enterprise is driven from the field.

Help from Those Not on Our Side

We will have much help in amending unfair legislation and some of this help will come, strange to say, from many engaged in, or proponents of, Federal power businesses. Battles are won as often by the weakness and the mistakes of the enemy as by the strength and skill of our own forces. The free enterprise system is inherently far superior to the socialistic system in the quality and quantity of its fruits. This truth may not be apparent in the early stages of national socialism, but it becomes increasingly evident with time and painfully obvious when the austere stage arrives.

However, long before this austere stage arrives the majority of people begin to observe the bad fruits of government in business, and the longer the agencies of the national government are in business, the more the disadvantages and the excessive costs become apparent. The people then experience a more profound and startling realization of the danger threatening their economic freedom and their cherished liberty. At the same time, the sad experiences, both economic and political, of people in foreign lands following the nationalization of their industries serves as a sharper warning and a stronger motivation to head off and drive back the movements toward national socialism in this land.

I venture to surmise that Congress will be moved to amend the unsound provisions of law affecting electric utility companies, not by any knowledge that the price at which Federal government power is sold represents only a part of the true cost of such power to the Federal treasury, not by showing up the false 18-inch yard-

stick of TVA, for example, but actually by growing irritation with the conduct of government power agencies and growing fear of big government and the ominous power of Federal monopolies. It will be alarm over the obvious and uncomfortably imminent outcome of continued expansion of big government that will bring about changes in the laws that are grievously handicapping our business. Only the American people, informed and purposeful, are big enough and strong enough to exert the influence required to correct legislation that is harming their best interests.

Under-Secretary Clarence A. Davis of the Department of the Interior recently made a speech in Denver in which he said, "I was first naive enough to believe it (the demand for Federal power development) was because they (promoters of Federal power development) were opposed to private enterprise in the utility field, but I am now beginning to discover their opposition is not merely opposition to private enterprise. It is opposition to any non-Federal activity, whether it be by a municipality, a public power district, a public utility district, or even by a sovereign State. The longer the controversy continues, the more clear is becomes that some of these people will be satisfied with nothing less than a complete Federal monopoly of the field of natural resources, including not only hydroelectric power but timber, mining on public lands, and the Federal control of irrigation through the assertion of paramount Federal rights to the water."

Growth of Government Power

The proponents of existing special tax privileges and preference clauses argue that the rapid progress of our companies in recent years shows that the complained-of discrimination and preferences have not been harmful to company performance. True, the progress is impressive, but we have advanced rapidly in spite of, and not because of, hampering legislation. The average price of residential electricity fell more in the 20 years before TVA than it has in the 20 years since. The investing public has been willing to invest in the billions of new securities required to carry out this rapid expansion because it has had faith that the course of the Federal government before very long would turn toward reliance on free enterprise and away from reliance on government operations.

There is, however, an inertia or time factor that must be taken into account in judging the threat of the situation. The Federal government is relatively a newcomer to the field of power generation. In 1935 it had less than 300,000 kw of generating plants, in 1945 it had five million, and in 1955 it will have 18 million and present plans contemplate still another 50 million kw. In 1935, the government was generating 555 million kwhr annually, in 1945 it was generating 28 billion kwhr, and in 1954, 68 billion kwhr. Without elaboration these figures show that corrective legislation to remove discrimination and inequities under which the governmental power agencies are flourishing becomes more and more imperative with the passage of time.

Destructive Tax Inequities

Wherein lies the destructive power of high taxes? In general, this power springs from eliminating or reducing incentive to hard work, to thrift, initiative, and risk-taking. How so? By seizure of the fruits of labor, of talents and special abilities, and of saving. In the intermediate state of destructive taxation, the exercise of taxing powers can accomplish specific destruction by exempting certain sectors of a business from their heavy burden.

We are in a time when taxes to support the costs of government have been superimposed one upon another to produce an enormous increase in the delivered cost of most articles offered to the public. During this important period of change, however, governmental proprietary businesses in many fields have remained exempted from taxes. In the case of power, the Federal government has also given other substantial subsidies which have caused governmental power businesses to expand vigorously.

The uninformed and unthinking are led to assume that because these government businesses sell their products at prices lower than privately-owned business is able to offer, the government-operated system is better than the investor-owned system, and that therefore the government should go further and deeper into business as a means of holding down the high cost of living. The high cost of taxation, as it affects the cost of living to the average American family, drives that family to demand that the government do more and more things for it. Thus, taxation itself creates a pressure to push the government deeper into all businesses, including electric power, even though the cost of electric power represents only 1 per cent of the cost of living. Too few stop to realize that a 4 per cent tax cut would save the average family more than the cost of their entire electric bill.

Private power plants generate taxes as well as electricity. Today, when tax monies are so much in demand and so hard to supply, it is down-right criminal to exempt government businesses from taxation, and more, to operate them at a loss and, therefore, as an added cost to the taxpayer.

The unsoundness of the whole situation becomes more and more difficult to hide from the American public. The shape of many undesirable things becomes apparent and won't stay covered up. A heartening by-product of the political tempest over the AEC-Dixon-Yates contract has been to extend widely the knowledge of the press and of the public that TVA business is heavily subsidized by the Federal taxpayer.

To illustrate how tax inequities lie at the root of the government-owned vs. investor-owned power issue, the average utility company is now paying 22.8 per cent of its gross revenue in Federal, state, and local taxes, and has been doing so for the past several years. TVA is paying 2.7 per cent of its gross revenue in lieu of local taxes. Consider the cumulative effect of such a differential.

Tax-Exempt Securities

No governmental power business pays any Federal taxes, although the companies are paying an average of 13.9 per cent of gross revenue in Federal taxes alone. The difference is even greater than this figure indicates because the governmental operations that are financed by bonds

sell tax-exempt securities, whereas the average security holders of electric utility companies pay a substantial percentage of their income from these securities in income taxes to the Federal government. This brings an added burden on free enterprise because the investor is given a strong incentive to put his money in tax-exempt bonds, thereby reducing interest charges on such bonds and cutting down the capital charges against the governmental business they finance.

Sharing the Tax Burden

Governments must be supported and the customers of all business should in fairness be required to pay their share of the cost of government in common with the customers of the electric utility companies and of other industry, but the customers of government power businesses are exempted from paying their fair share and the proponents of such existing special tax privileges of governmental power businesses attempt to obscure the issue by saying there is no sense in governments paying taxes to themselves. That is not the issue at all. It is simply a question of the customers of government businesses paying through their rates their fair share of the cost of the support of government and of these payments being covered into the public treasury to effectuate this sharing of the tax burden.

Needed Corrective Tax Legislation

Let us briefly outline the corrective legislation necessary to bring tax equality to customers of all power systems:

1. All Federal power projects should be required by statute to include as part of the project and part of the operating costs such sums as would be payable as taxes by private enterprise carrying on the same or similar business. The portion of such sums as would be equivalent to Federal taxes should be paid into the Federal treasury.
2. Federal power projects or the part of Federal multi-purpose projects realistically allocated to the power function should be made subject to state and local taxation the same as other property and business and the tax payments made to the respective tax-collecting agencies.
3. The tax exemption presently enjoyed by the proprietary power businesses of states, municipalities, public utility districts, and other governmental proprietary businesses should be removed.
4. The tax exemption on the income from securities issued to finance such governmental power businesses should be removed, or the same exemption extended to income from securities of all businesses.

A Fair Marketing Policy

The unfair and indefensible provisions of law covering the sale of power from Federal generating plants wherein preference is granted to a few at the expense of the many should be corrected. These provisions of law are increasing in their scope and force and are now being aimed especially at atomic energy. The value of preferences in buying power from Federal projects arises entirely from the fact that the Federal government generally sells its products far below true cost. What the consumer is not charged, the Federal taxpayer is compelled to make up to balance out the cost. In many sections of the country the true cost of power from government projects is higher than the market value for power, which points up the fact that Federal power is never cheap, and often is very high-cost power.

This unfair legislation concerning the sale of power from Federal generating plants should be amended to require that power be sold at the point of generation at its fair market value and be allocated in proportion to the number of rural, residential, and retail commercial customers served by the respective applicants. At the same time the Federal government, in the interest of all taxpayers, should be required to compute its true cost of power, including the full cost of money and the full equivalent of Federal and local taxes. Where the cost of government power would then exceed its market value, Congress should be periodically informed of the losses of those particular projects.

If the sale is made at fair market value, the Treasury gets the maximum return obtainable from its investment in power. If it is sold at the point of generation, the Federal power business is kept strictly incidental to navigation, flood control, irrigation, or other such purposes and the Federal government would not become involved in assuming the obligation of providing for the future load growth of any area.

If the allocation is in proportion to the number of rural, residential, and retail commercial customers served by the applicants, the principle of fairness is reinforced and the pressure for, or temptation to, under-pricing is minimized.

Faulty Concept of Government Costs

Let us examine Federal government estimates and computations of cost. The Federal Power Commission, in figuring the cost of power produced by Federal projects and in approving rates for power generated and delivered from such projects, uses only 4.4 per cent as *total* fixed charges on Federally financed hydroelectric plants and only 3.9 per cent as *total* fixed charges on Federally financed steel tower transmission lines. On the basis of those figures, it decides in favor of building dams and of building transmission lines which often duplicate, at least in considerable part, existing or proposed investor-owned lines. Power companies generally find their total fixed charges run between 13 and 14 per cent. Note the striking disparity between the two sets of figures. What is the reason for this difference?

Taxes alone amount to two-fifths of the total fixed charges of the power companies. This is what their customers pay for the support of government. The customers of the Federal power businesses should pay the same share of the cost of government as customers of other businesses. When the Federal government builds the power part of a Federal dam and when it builds a transmission line, it and the local government forego the taxes they would receive if the facilities were privately owned. The taxes foregone by the Federal treasury and the state and local treasuries are a real and true cost and should be so reckoned and acknowledged in the Federal government cost calculations.

Then there is the cost of money.

The Federal Power Commission uses 2.5 per cent as the cost of money for Federal projects, yet the Federal government has recently put out 3 per cent bonds, and in addition the Treasury has the costs of handling the financing. Congress should ask the General Accounting Office or the Treasury Department to give it the total over-all cost of Federal financing of these plants. It would surely run on the order of 3½ per cent at the present time, so that the new projects now being built or planned should carry a figure of that order as the cost of money.

Suitable Fixed Charges

Total annual fixed charges on Federal hydroelectric and transmission line projects should carry 5.4 per cent for the equivalent of taxes, Federal, state and local. There should be an item of about 3½ per cent for the cost of money, and an annual amortization charge of 2 per cent on a 50-year life for such projects. (I take straight line amortization, as recommended by the Engineering Joint Council, because it tends to reimburse the present taxpayers who have to put up the money for the project rather than a subsequent generation of taxpayers.) Fixed charges should also include a small item of a quarter of one per cent for replacements to keep the property in operating condition during the amortization period, and a charge for insurance, bringing total fixed charges of the order of 11 per cent, which is a far cry indeed from the 3.9 per cent and 4.4 per cent used by the Federal Power Commission in figuring rates.

Lifting Tax Load

Such charges would lift from the shoulders of the taxpayer a big part of the tax load he now carries because of these projects. Of course, power revenues from most of the projects built and planned to be built cannot support annual fixed charges of 11 per cent because the power could only be sold at what it would bring on the market. In those cases, the taxpayer would be forced to continue to bear part of the cost, but certainly not the large part he is now involuntarily required to sustain.

The President in his budget message to Congress this year stated: "Payment of interest on power investment—A proposal is being developed for submission to the Congress to provide that payments of interest be made to the Treasury on money invested by the Treasury in TVA power facilities."

Faulty Statement of Investment

The TVA and its defenders invariably use 2 per cent as the cost of government money and in recent reports refer to an investment applicable to power of about $1 billion. This statement of investment in power plant leaves out all plant under construction or not yet operating. It also disregards cumulative interest amounting, as of the present time, to between $300 and $350 million that TVA has not been required to pay, but which the taxpayer has had to pay out as "Interest on the Public Debt." For the Federal taxpayer to come out whole in the interest transaction, the amount against which interest should be charged would have to be about $1¾ billion. Now 2 per cent of $1 billion is $20 million in annual interest, but 3½ per cent of $1¾ billion is $61 million a year in interest. Congress should see to it that the figure required to recover the Treasury's money costs on account of the TVA power business be collected from the TVA power users.

TVA is now asking Congress for power to issue its own revenue bonds, which would, by the way, have priority over the existing $1¾ billion investment the taxpayer now has in it. Thus, the last real restraint that Congress and the taxpayer have on this huge bureaucracy would be removed. Certainly, until existing abuses have been corrected by legislative action, we should be watchful of any scheme which would facilitate further empire building by governmental proprietary business agencies.

It is the below-cost prices of electricity charged by the government power projects that put significance and propaganda value in preference clauses.

Other Operating Costs

Aside from fixed charges, there is a substantial operating cost that is ignored in government cost accounting—the administrative and general expenses of the government arising from its proprietary businesses. According to the Federal Power Commission, administrative and general expenses of power companies amount to 6.5 per cent of total operating revenues. The administrative and general expenses of the Federal government percentagewise surely must be double that of private business, but, again, the taxpayer bears the load.

It should be clear by now that there is no magic by which government can produce and distribute electric power at any lesser cost than it can be done by private enterprise. That the government power issue is political rather than economic is further demonstrated by the fact that if there were some magic in which electric power could be supplied entirely free, without any cost, it would reduce the cost of living by only 1 per cent. Surely there are more fertile economic fields for political attention.

Eliminating Duplicate Regulation

When the Federal Power Act was passed in 1920, provisions were inserted therein that undoubtedly were designed to avoid super-imposed Federal regulation on top of state regulation. Section 19 of that Act carried the proviso: "That the jurisdiction of the commission shall cease and determine as to each specific matter of regulation and control prescribed in this section as soon as the State shall have provided a commission or other authority for the regulation and control of that specific matter."

Part II of the Federal Power Act, enacted in 1935, provides that Federal regulation over the transmission of electric energy and interstate commerce and the sale of such energy at wholesale in interstate commerce shall "extend only to those matters which are not subject to regulation by the states."

Unquestionably, most members of Congress in voting for this regulation assumed that the provisions quoted would prevent duplicate regulation between the Federal Commission and the state regulatory commissions.

If you have not already done so, I recommend that you read the statement of Carl Ernst, Vice President

and General Manager of the California Electric Power Co., which was presented at an informal conference of representatives of the Edison Electric Institute with the Federal Power Commission in December, 1953. The facts brought out in his statement simply and forcibly expose duplicate regulation to an advanced degree, regulation so substantial and burdensome as to become stultifying. It shows the extent to which bureaucracy is both led and driven to expand its jurisdiction, and is supported by judicial review in doing so when the Federal statutes do not place rigid limits upon it.

Strict Definition of Powers

Experience shows that bureaucratic powers must be hedged in by solid walls and not just marked by single posts which can be by-passed on either side and left standing far to the rear by the advance of Federal domination in the field of regulation. It shows that the problem must be dealt with on the fundamental principle of restricting duplicate regulation and overlapping jurisdiction to the absolute minimum. The nature of the exercise of national government powers is such as to require this, what would otherwise appear to be unnecessary definition. If this principle were accepted by both the Federal government and the states, it should be a simple matter to draft a statute that would leave regulation in the hands of the respective states. The Federal Power Commission should be required to accept the decisions of the state commissions concerned in practically every situation that might be conceived. Rates and other contract provisions would be dealt with at the state level.

If the principle that there shall be no unnecessary duplicate regulation is accepted, there remains practically no reason for licenses for the use of government lands or navigable waters to be concerned with anything more than bona fide conditions which relate solely to the use of such lands or to the operation of substantial, not theoretical or inconsequential, navigation. Such conditions would protect the public interest, expedite licenses, and simplify their administration.

If the major licenses making use of government lands were limited to those where more than 25 per cent of the project area were on government land, the number of projects requiring major licenses would be reduced about one-third. In any case, however, if the element of Federal regulation were eliminated and kept eliminated, where states have regulatory bodies, all licenses of the use of government land would, with few exceptions, be reduced to a small document, easy to administer and involving relatively small costs to the government and the companies.

Interstate Power Transactions

With respect to Part II, of the Federal Power Act, which relates to interstate transfers of electric power, the business of interchange of power is extremely complicated, so much so as to almost defy exact analysis. Nor does the situation stay put. What is true at one time can change in a brief period. The economy of such transactions necessitates concentrating direction in the hands of a very few load dispatchers, operating under agreements whereby the maximum over-all benefits are striven for and where reasonable rules of dividing the benefits among the participating companies can be agreed upon by reasonable men. An attempt at an exact analysis of these provisions, a lack of the spirit of give and take, and the introduction of rigidity due to the inherently heavy hand of Federal government control, notwithstanding the best intentions to facilitate the operations, are enough to kill the undertaking or extract therefrom a large share of the profit which would otherwise accrue to the consuming public.

Modification of Federal Law

This matter of interstate power has become so complex that in my opinion it will be necessary to get back to fundamentals. In the meantime, the Federal law should be modified to exempt emergency, economy interchange, and "slop-over" transfers involving interstate boundaries. It should be modified to exempt in positive terms the purchases of outstate energy for use within a state that is purchased at the state line or within the state where the power is consumed. It should also exempt sales at state lines or sales within a state to agencies transmitting across a state line for sale without the state. Such corrections, in my opinion, should be made without delay because they will affect materially the long-range plans of many companies and groups of companies in their serious endeavors to secure the lowest possible cost of electricity to their customers.

I would like to repeat that statement. We are concerned with the removal of tax privileges and preference privileges for governmental businesses and the removal of duplicate regulation of our companies—in all of these things we are concerned not in the interests of greater profits to the companies, but to secure the lowest possible cost of electricity to their customers.

The foregoing, in my opinion, are the more important and significant provisions of Federal statutes calling for correction. It will be a long, slow, arduous task to bring them about. It will take all the faith, the patriotism and the united effort we can muster to accomplish it. We must be fortified with purpose and understanding that is broader, more profound, and more persistent than merely our own selfish interests could command. We must keep before us always the fact that our cause is just and that we are working to discharge an obligation to our customers.

The Larger Stake

The larger stake is the preservation of liberty in our land, because the right to choose, with all that this means, cannot exist except where there is economic freedom and that exists only where there is free enterprise.

Our struggle for wise and just laws must go on. It is our part in the cause of liberty. Our efforts will gain strength from the clear understanding that we fight not only for this generation, but for future generations of Americans, the ones who would live to experience the full dreadful consequences of any failure to stem the tide threatening to engulf the world today. The American's traditional love of individual freedom assures us that once the issues are clear we need have no fear of the outcome.

Texas Power & Light Company Wins Charles A. Coffin Award

"FOR extraordinary enterprise and resourcefulness," particularly in opening up new possibilities for economic fuel use of the nation's untapped lignite resources, Texas Power & Light Co. has been awarded the Charles A. Coffin Award for 1954.

The electric industry's highest honor was presented to W. W. Lynch, TP&L President, by Philip D. Reed, Chairman of General Electric Co., in ceremonies conducted on June 15 during the 23rd Annual Convention of the Edison Electric Institute, at which Harold Quinton, Institute President, presided.

Two Primary Objectives

In its investigation of lignite, Texas Power & Light had two primary objectives: the development of a low-cost fuel for production of electric power, and the use of this latent natural resource in the further industrialization of the TP&L service area.

Lignite, also known as "brown coal," is a low-rank, non-coking fuel intermediate between peat and bituminous coal, still showing the texture of the original prehistoric wood from which it was formed eons ago.

Lignite Plentiful

Plentiful in Texas, lignite had been used in one TP&L generating station, until it was dropped in the early '40's for natural gas. Lignite claimed little further attention until TP&L began an extensive research program in 1948.

Six years later, in April, 1954, dramatic evidence of the success of the company in meeting its objectives came with the opening of the Aluminum Co. of America's new smelting plant in the little Texas town of Rockdale. For the first time, lignite was used to generate electric power for making aluminum; and the new plant, with an annual capacity of 180 million pounds of the strategic white metal, brought with it nearly 1,300 new jobs and a $5 million payroll, changing Rockdale from a farm market community to a thriving young city. Since then, ingot casting facilities have been added and plans have been announced to increase smelting capacity by an additional 90 million pounds.

Texas Power & Light Co. President W. W. Lynch (center) accepts on behalf of his company the Charles A. Coffin Award for 1954. Making the presentation during the 23rd Annual EEI Convention was Philip D. Reed (right), Chairman of General Electric Co., donor of the award. Institute President Harold Quinton (left), who presided at the ceremonies, watches the presentation.

Months of Effort

To produce this result, TP&L expended months of effort. In one phase, extensive reconnaissance to locate lignite beds defined commercial deposits ranging from 10 million to 300 million tons, with an aggregate reserve in excess of 1 billion tons.

In the all-important laboratory phase, TP&L entered into an agreement in 1950 with the U. S. Bureau of Mines to determine how Texas lignite could be used more effectively as a fuel. This research, under the direction of the Bureau's Dr. V. F. Parry, resulted in the discovery of a process of dehydrating and charring crushed lignite, increasing its "firepower" by three-fourths. Further, the process produced important marketable by-products.

Offer to Aluminum Companies

TP&L was then in a position to make an unusual offer to aluminum companies, always on the look-out for assured sources of low-cost electricity in great quantity. The utility promised to make available its lignite experience, a large deposit of lignite, the new Parry process, and further would act as agent in building and operating a power plant fueled by lignite and act as marketing agent for all by-products. Alcoa decided to construct a four-pot alu-

(*Continued on page* 256)

Super-Critical Pressure—An Essential Forward Step in Power Generation

By R. G. Rincliffe
President, Philadelphia Electric Company

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 13, 1955

IN its relatively short life, the electric light and power industry has constantly worked toward greater reliability and greater efficiency because, being good business for our customers, it was good business for us. And that will continue to be true so long as men do business together.

The tremendous increase in the nation's power requirements in the years ahead, in a period of rapidly declining fuel reserves, even in the face of expanding use of atomic power, will greatly intensify the electric light and power industry's drive toward more efficient power generation. This drive actually began way back when steam was first put to work, apparently by Hero, who described a spinning sphere almost 21 centuries ago. Driven by steam, on the reaction principle, about the hardest work it could do was to drive the roasting spits for the great feasts of those far-off times.

Centuries passed before the other great principle of steam power was developed in 1629 by Branca, who made use of the impulse principle to turn a bladed wheel.

At Threshold of Greater Progress

Now, however, with the reaction and impulse prototypes of the modern steam turbine finally established, civilization was at the threshold of greater progress toward more efficient power generation. Only 70 years later, in 1699, Savery's so-called engine made use of the vacuum created by condensing steam. It was, perhaps, the first application of steam power to industrial use, for it was put to work pumping water from mines. Its efficiency was low, of course, but it represented progress.

The first known water-tube boiler was built in England by an inventor named William Blakely, a versatile fellow who appears to have been a maker of clocks, a medical practitioner who professed knowledge of the treatment of hernia, and a steam engineer. However, he could not possibly have foreseen the long-range significance of his boiler, for it was of the monotube design, a principle of steam generation basic to the very latest increase in efficiency of power generation.

R. G. RINCLIFFE

The steam turbine is generally considered of European design. But the fact is that as early as 1833 steam turbines were built commercially in Syracuse, N. Y., by William Avery. Of the "Hero" reaction type, Avery's turbines, used principally to drive saw mills, were reported more economical of fuel than the reciprocating engine they replaced. In 1836, another of Avery's turbines is said to have propelled a locomotive that came to an untimely end in a ditch near Newark, N. J.

In 1711, Newcomen, with the first piston engine, achieved a truly remarkable increase in efficiency, to an equivalent output of 55 kwhr per ton of coal.

Steam at almost atmospheric pressure raised the piston of Newcomen's engine. When the steam was shut off and condensed with a jet of cold water, atmospheric pressure forced the piston down again.

The alternate heating and cooling of the entire cylinder of the Newcomen engine represented a great waste of heat. Fifty-eight years elapsed before James Watt developed his engine which provided for condensing the steam in a separate vessel outside the cylinder. This more than doubled efficiency, to the equivalent output of 130 kwhr per ton of coal.

It is often forgotten that Watt accomplished a great mechanical achievement as well. He developed the skill to make his pistons "almost round!" It is true today, too, that increases in the efficiency of power generation continue to be the product of many skills.

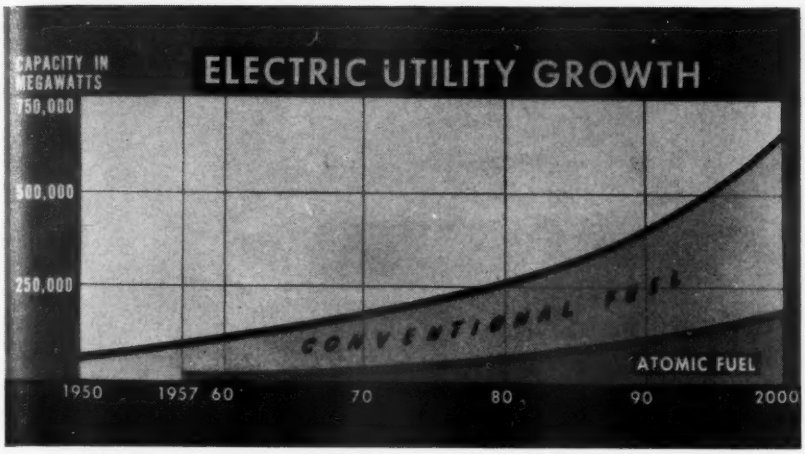
The next century of progress culminated in Edison's successful establishment of the central station and, of course, the electric utility industry itself.

460-Kwhr Output Confounded Critics

In 1889, the Philadelphia Electric Edison station went into operation. Its output of 460 kwhr per ton of coal completely confounded the critics of those days who questioned the design of a new type dynamo with double the capacity of the largest then approved, as well as the projected steam working pressure of 150 lb.

The reasons it supposedly would never operate were packed into 18 closely written pages, but this station gave a good account of itself for a full quarter of a century!

Once again, technological development of both materials and shop practice had to catch up to needs, this time the needs of turbine development.



By 1895, license agreements brought the Parson's turbine to the United States and its efficiency increased output to 500 kwhr per ton of coal. Of the reaction type, the Parson's turbine drove a 150-kw, single phase, a-c generator, with steam produced by hand-fired water-tube boilers. Yet, in only five more years, output was more than doubled, to 1050 kwhr per ton, by the 2000-kilowatt unit installed by the Hartford Electric Light Co. This turbine, with a capacity several times greater than that of any of predecessors, had extremely large physical dimensions. Also, at about this time, stokers were being successfully applied to steam boilers.

1730 Kwhr/Ton of Coal in 1915

Condenser performance now began to attract attention, as turbines began to take over from reciprocating engines, until, by 1915, most of the principles of modern condenser design were well established. Thus, larger turbines, together with surface condensers capable of producing modern-day vacuums, brought average performance up to 1730 kwhr per ton of coal.

It is quite probable that only a few visionaries expected efficiency to be increased much further, but such is the nature of our industry and the inspired men in it that, almost overnight, 2100 kwhr per ton of coal was achieved in a number of stations. Two of the developments making such output possible were pulverized-coal firing and regenerative feed-water heating. Yet the rapid increase of efficiency went right on.

In only three more years, output reached 2400 kwhr per ton, when the first large turbine designed for 600-lb steam, superheated to 725 F, then considered the maximum safe temperature, was provided with a reheat cycle. However, instead of improved efficiency, the principal purpose of the early reheat application was to reduce the moisture content of the exhaust steam.

But in another 20 years, general adoption of the reheat cycle was required by the postwar rise in fuel and operating costs, and efficiency rose still further to 2600 kwhr per ton of coal. The unit boiler-turbine system greatly simplified reheat control.

In another four years, an output of 2900 kwhr per ton of coal was achieved through the next logical advance in the industry's evolution, a further increase in temperature and pressure, although still along conventional lines. Operating pressures and temperatures had now reached 2400 psi and 1100 F. Units of 150,000-kw capacity, and larger, became not only practical but desirable in view of the steadily increasing demand for power and the strides in technology.

The decision in 1953 of the American Gas and Electric Co. to install the 120,000-kw super-critical unit at their Philo plant was an entirely logical development.

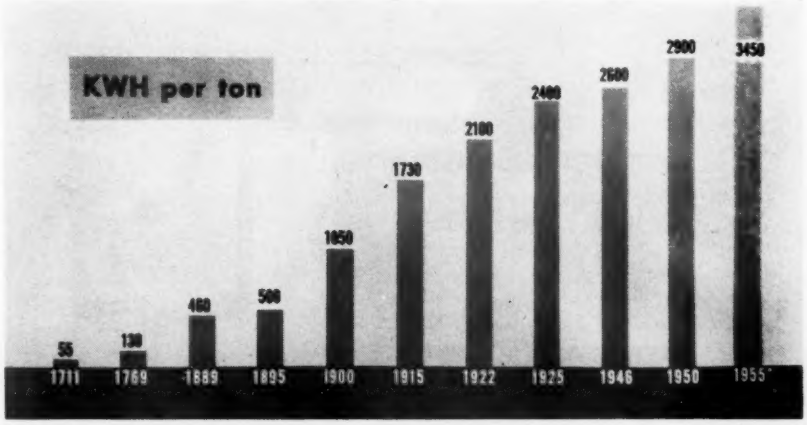
Thus, the progress of power generation stands clearly revealed in the almost-fantastic rise in efficiency represented by output in terms of kwhr per ton of coal.

Starting at the approximate beginning of the electric industry, just 66 years ago, in 1889, the equivalent output of the old Philadelphia Edison station, as a typical example, was only 460 kwhr per ton. These units, in their day, represented the ultimate. Each produced 165 kw at a heat rate of 60,000 Btu per kwhr, from steam at 150 lb pressure and 365 F.

Performance of Today's Units

But such is the driving urge for progress among all members of our industry that to-day Philadelphia Electric is building a new generating station which will house the world's largest and most efficient turbine generator, a cross-compound unit to produce 325,000 kw at a rate of 3450 kwhr per ton of coal! The heat rate will be 8000 Btu per kwhr, an improvement in performance of 750 per cent over the old Edison station! The steam will be used at record high super-critical pressure and temperature of 5000 lb and 1200 F!

The electric utility industry can



Progress in Fuel Utilization.

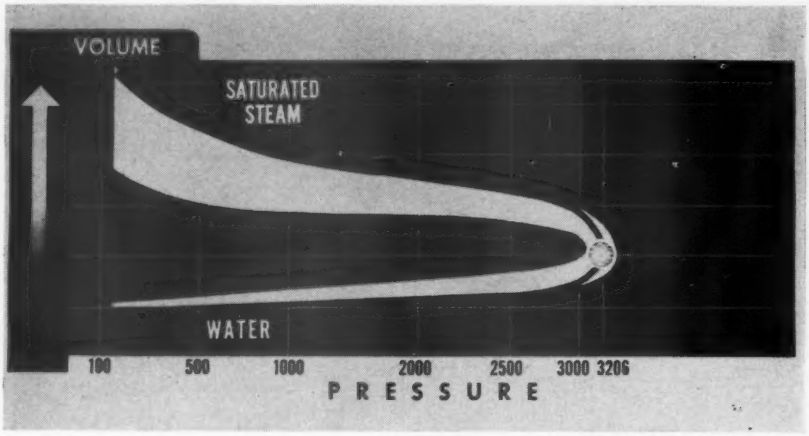
point with pride to these developments. But I am confident all of us will soon join together to point at some still greater accomplishment of our progressive industry.

Now let us consider "super-critical pressure." First we must bear in mind the physicist's definition of the "critical point." It is simply the pressure and temperature of a substance at which the densities and other physical properties of the liquid and gaseous states are identical.

Conditions at Super-Critical Pressures

Designing and building for operation above this point obviously represents a break with tradition, and clearly requires not only a new approach but a new state of mind. As everyone recognizes, the volume of one lb of steam is far greater than the volume of the lb of water that yielded the steam. As pressure and temperature are increased, the volume of the saturated steam decreases progressively faster, while the volume of the water increases only slightly until, at the critical point, the volumes are identical. Beyond the critical point, at super-critical pressures, the volumes remain identical, steam and water having the same density.

Design-wise, what does this mean? First to be considered is the conventional boiler system, consisting of a boiler drum connected by tubes to its water supply drum. When heat is applied to the tubes, the water temperature is raised and it starts to circulate. Steam forms in bubbles in the tubing and is collected in the drum.



Relationship of Steam and Water Under Pressure.

The steam is then piped to the turbine, where it does its work. Then it is condensed and pumped back to the boiler. Impurities in the water are collected and removed by "blowdown."

In super-pressure operation, using the monotube, once-through steam generator, water is circulated by pumps at very high pressure. As heat is applied, the water temperature increases, and when it reaches the critical point, steam is formed almost instantaneously without boiling. The steam at this point is as dense as water.

This system involves several new considerations. One is the removal of the minute quantity of impurities from the water, because there is no place in the boiler system for blowdown. The solution of this problem, which is the use of water practically free from impurities, is commercially available in the form of a demineralizer, through which about one-third of the total water flow of the system constantly circulates.

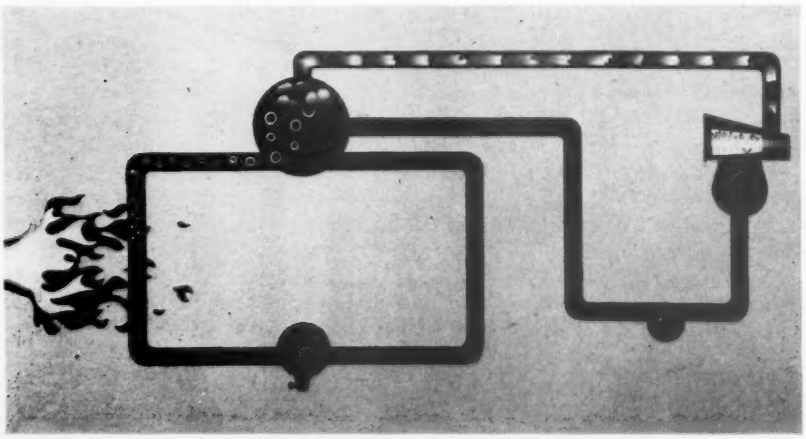
Operation of the demineralizer itself follows proven practices that take advantage of the fact that dissolved solids are actually electrically charged particles. In actual practice the materials in the demineralizer are a mixture, but are shown here in separate layers to demonstrate the process.

The water from the condenser, with its small quantities of impurities, enters the demineralizer, flows through the anion and cation resin, where it gives up its negative and positive particles before being returned to the system in a pure state.

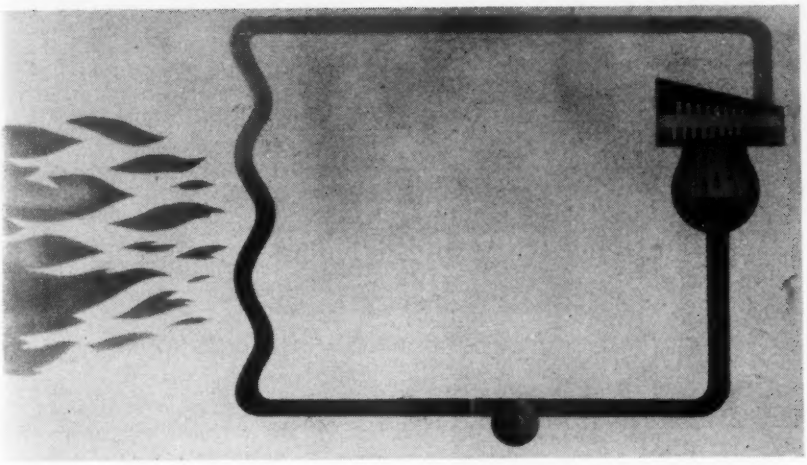
Water Purity Highly Important

Water purity, when referred to in connection with super-critical pressures, is no mere figure of speech. It is less than five one-hundredths of a part per million. It is the equivalent of all the water in a standard championship swimming pool, completely devoid of all except one tablespoon of impurities! It is so pure that, in the presence of even minute quantities of extra oxygen, it becomes corrosive. To keep it from attacking all metal it touches, the latest and best means to remove the free oxygen will be used.

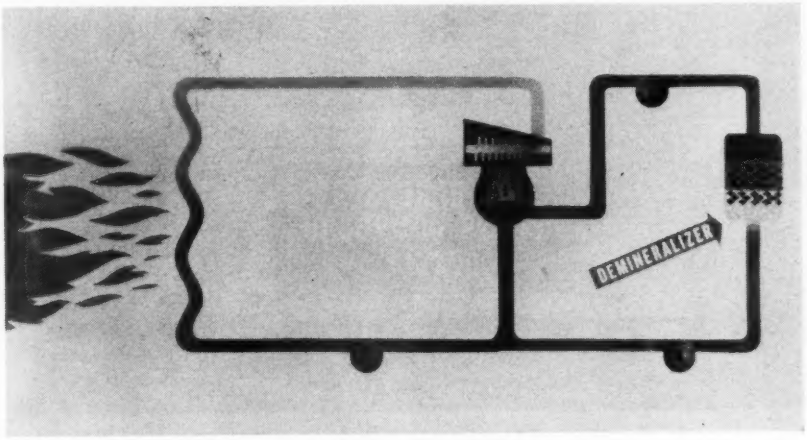
There are also metallurgical problems. Just as people have characteristic personality traits, so do metals. Both must be carefully selected for their jobs by balancing their strong points against the requirements of their specific tasks. In the choice of metals for this system, we are con-



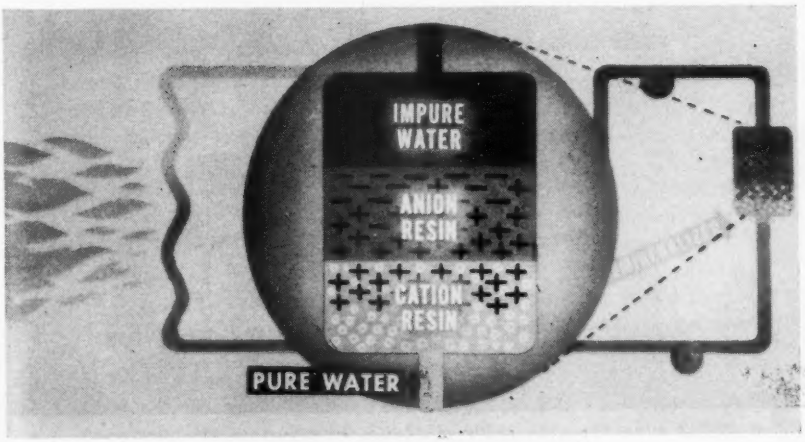
Conventional Generating Station Steam Cycle.



Super-Critical Generating Station Steam Cycle.



Application of Demineralizer in Super-Critical Cycle.



Principle of Demineralizer.

cerned principally with the elevated temperature rather than with the pressure.

At the turn of the century, cast iron had a perfectly satisfactory "personality" for use at the then-current maximum temperature of 450 F. By the time higher temperatures were needed, the carbon steels were ready to take over the job and gave a good account of themselves at temperatures up to 750 F. Then low alloy steels, containing small amounts of chromium and molybdenum, made it possible to design and operate at temperatures in the 1000-F range. At the 1200-F temperature used with this super-critical operation, however, none of these alloys has the right "personality." Literally, they "can't take it." So again, with the help of the metallurgists, we are turning to super-alloys containing relatively large proportions of chromium and nickel, together with small amounts of stabilizers, such as columbium and molybdenum.

Progressive Developments

Development of the proper techniques of forging, machining, and welding these super-alloys into the heavy pieces needed by the electric industry is progressing hand in hand with the other new practices and principles involved in super-critical operation.

A look at a conventional cross-compound cycle will help to indicate why the elevated temperature of the super-pressure system is not so critical a problem as it might first appear to be.

When this cycle, consisting of a steam generator and a cross-compound unit, with the high pressure and intermediate pressure turbine elements driving one generator, and the low pressure turbine driving the other generator, one stage of reheat, and the pumps and feed-water heaters in the return circuit to the boiler, you have satisfactory operation at pressures up to 2400 lbs, and temperatures as high as 1100 F.

Basically, the only changes in the conventional system required for this super-pressure operation are in steam generator design incorporating the monotube principle and including a second stage of reheat for greater efficiency, the addition of a small super-pressure turbine, more

feed-water heaters, and two more boiler feed pumps to provide the necessary extra-high pressure.

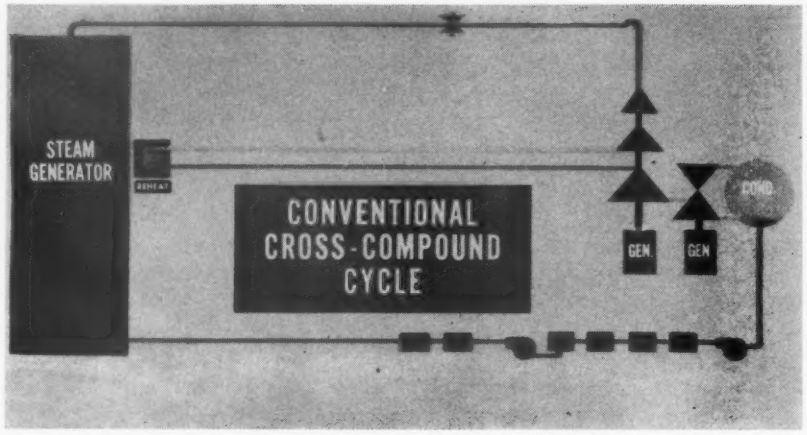
Of this entire system, the 1200 F operating temperature will affect only the final super-heating section of the steam generator, a relatively small part of the super-pressure turbine (just the inlet nozzles and the initial stages of blading), and the main steam piping between the steam generator and the turbine. One of the solutions to this set of problems is extra thick walls for the main steam piping.

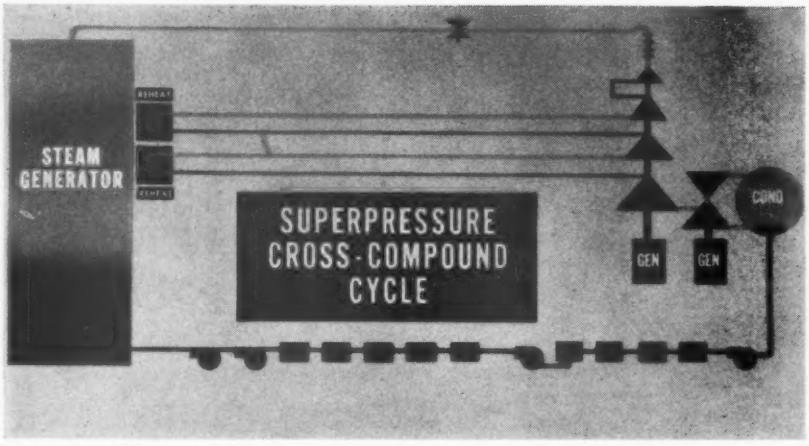
Our industry has always looked on problems as stepping stones to progress. That is why through constant cooperation among utilities, manufacturers, and research organizations, the industry has made spectacular progress in the conservation of energy resources despite constantly growing demands. Only three decades ago, the utility industry's heat rate was still as high as 24,000 Btu's per kwhr.

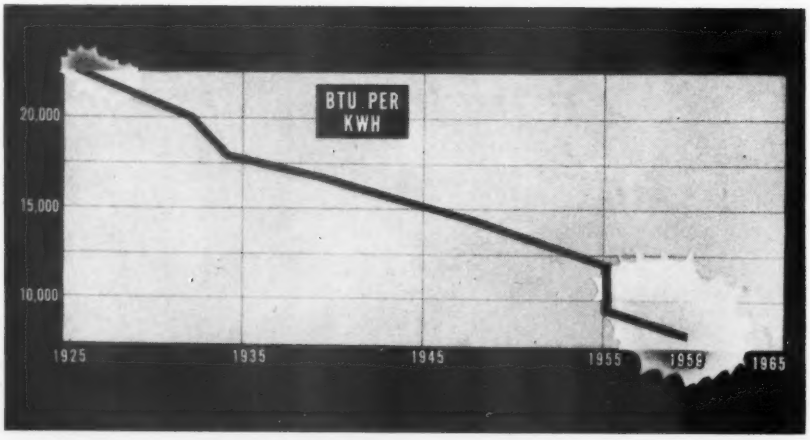
Nearing 9000 Btu/Kwhr Heat Rate

Over the years, as we have seen, our industry's efficiency has continually improved. We have decreased our average heat rate to approximately 12,000 Btu's per kwhr, and our most efficient plants are now approaching 9000 Btu's per kwhr.

The next step, the essential forward step in power generation, is super-critical operation. And that brings our rate down to only 8000 Btu's per kwhr. This amazing increase of efficiency is proof that the investor-owned, tax-paying electric utility industry has fully accepted the responsibility to conserve our nation's energy resources. Just suppose we had rested on our 1925 laurels and that we had not increased our efficiency. By 1965, only ten years hence, to supply the expected demand, we would be consuming coal at the astronomical rate of 1000 million tons every year! But we have increased our efficiency with supercritical performance, and precisely the same tremendous output of electric power can be obtained from only one-third the coal! That then is the measure of our pledge to the people of this nation, our owners, and our customers—to apply constantly, and unremittingly, our every effort toward more efficient power generation.







Increasing Generating Capacity of Electric Utility Industry.

Far Western Growth Makes Utility History

By James B. Black

Chairman of the Board, Pacific Gas and Electric Company

An Address before the Twenty-Third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 14, 1955

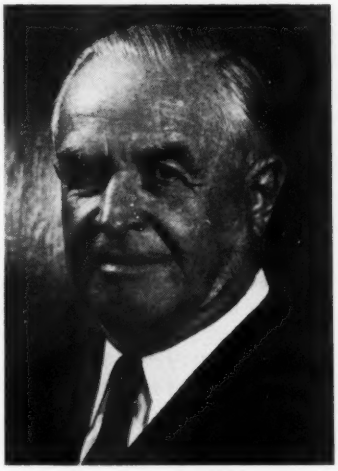
THERE is significance in the selection of California for the 23rd annual convention of the Edison Electric Institute, for nowhere did the electric industry gain an earlier start, and nowhere has its growth in this postwar decade been greater. The California Electric Light Co. began serving arc lamp lighting customers in San Francisco from the industry's first central station in September, 1879. That was a few months before Thomas A. Edison applied for a patent on his first incandescent lamp, from which our industry has grown.

It would be tempting to dwell on details of our development over the past 75 years. The unceasing growth of the Pacific Southwest has reached such proportions in the postwar decade, however, that it is pertinent to review this recent period. In the great tradition of the industry, the utility companies of our region have been in the forefront of this growth and we believe have served it well.

Predicted Slump

In light of what is now fact, it is a little difficult to recall that at the end of World War II there were many alarmed predictions of a severe slump in the war-stimulated economy. Here in the West, it was questioned whether there would be jobs to sustain the vast new population, or whether it would melt away. It is fortunate for the region that the utility companies took an optimistic view and at once prepared to build new capacity as quickly as we could, for each year since 1945 tens of thousands of newcomers have arrived to settle in our midst.

The Pacific Southwest is the fastest growing region of the United States. Never has the nation witnessed a greater migration of population than the movement into this area in recent years. The postwar rate of population increase in Arizona, Nevada, and California has been more than half again as fast as that of the country as a whole, while California in a single decade jumped from fifth to second most populous state in the nation. The State's gain for the twelve months ending July 1 is estimated at 560,000 inhabitants. Optimists place California first among the states in population by 1965.



JAMES B. BLACK

This record growth naturally has brought about substantial changes in our economy. Agriculture retains its top position with an annual value in the three states of $3 billion. From a dominant role, however, it has given way to a balanced economy marked by large and growing industry.

Residential construction in our area is phenomenal. During the postwar decade it has represented about 17 per cent of the national housing construction for less than 8 per cent of the national population. If you flew into Los Angeles you may have glimpsed from the air how new suburbs have spread in all directions. Houses now cover tens of thousands of acres of former farm land. There is, of course, a chain reaction from this construction on business of all kinds.

Commercial and industrial construction is hardly less notable. It is a development with national significance that the West now has a population large enough to support all types of commercial and industrial enterprise. For example, a growing steel industry is established, and our aircraft and electronic industries can be counted among the leaders of the nation. New commitments were made throughout California, Arizona, and Nevada during last year alone for more than 1200 new plants and expansions totaling almost half a billion dollars in value.

Since World War II our investor-owned utility companies here in the Pacific Southwest have added nearly 1,400,000 electric customers to their lines, about a two-thirds increase in nine years.

Sales, Load Growth

Kilowatthour sales and the area peak load, to which both investor-owned and other systems contributed, have more than doubled since the war. Last year area sales reached a level of 38 billion kwhr and the area peak load served was 8 million kw.

Now let us look at how generating capacity has been increased. In nine years more than 5 million kw of dependable capacity has been added in our region. Last December the total dependable capacity in the three states was nearly 10 million kw, double what it was at the end of the war. Nor is this all. Construction already planned for completion before 1960 amounts to more than 5 million kw additional.

I need not emphasize that construction on such a huge scale could not have been undertaken without the confidence of both individual and institutional investors and the assistance of the investment bankers. The

investor-owned companies of this area have been almost constantly in the market for new capital. Together, we have spent a total of nearly $2 billion on electric plant since the war, and to finance this construction have successfully marketed nearly $1½ billion of securities. My own company for all purposes has raised over $1 billion of new money since the end of the war. Our combined achievement reflects a confidence of investors in the future of our region and the companies as a group in which we of the industry take legitimate pride.

At the close of 1954 ownership of the companies was vested in more than 386,000 stockholders, a gain of 142,000 in nine years. A high degree of local ownership of the stock is characteristic. Again referring to Pacific Gas and Electric Co., for example, nearly two-thirds of our 217,000 stockholders are Californians and they own about half of our outstanding stock. Such widespread ownership of the stock of utilities under regulation truly is public ownership in the highest sense.

Record Refutes Zealots

In this connection, you will recall the much-repeated claim of government power zealots that the investor-financed utilities are not capable of providing alone all the power the country needs. They have sought to foster a belief that here in our area we must be dependent in major degree on government hydroelectric projects to supply demands for energy. The record of the industry in this region of greatest growth in the United States refutes this specious claim. In my own company's service area, the Federal government from 1945 through 1954 added only 300,000 kw of installed capacity. In the same postwar period we have installed 2½ million kilowatts in an expansion program on which we have spent, for all purposes, $1½ billion. In terms of total capacity, our system alone has almost double the kilowatts installed in Federal plants in the Central Valley and Colorado River developments combined.

Before we leave the subject of power expansion in this region, note may be taken of a change in the character of total resources. Historically, we have been known for our hydroelectric development, and at the end of World War II the area had twice as much dependable hydroelectric capacity as it had in steam. Today steam capacity exceeds hydro by more than a million kilowatts, and over the years the preponderance of steam will grow.

Reasons for Turn to Steam

We have turned to steam partly because steam plants could be built more quickly to meet the rapid growth in demand. More significantly, relative costs per kilowatt of steam and hydroelectric capacity have become moving targets going in opposite directions, and we have had to draw a fresh bead at every step in our expansion. While steam plant efficiencies have been steadily rising, the quality of remaining hydroelectric sites has progressively declined. In our territory, for instance, about a third of the total hydroelectric potential has been or is being developed and another third is actively projected for development in the next ten years. The remaining potential beyond that is of doubtful economic value. There will, therefore, be increasing reliance on steam generation to meet future demands.

The early development and substantial growth of hydroelectric generation in California sprang from the elaborate system of mining waterways constructed during the gold rush. These same waterways stimulated the practice of irrigation, which has had such profound effect on the development of the West. Electric pumping for irrigation had been tried successfully in California by the early 1890's. This was the real beginning of farm electrification in America.

Irrigation Increases

In the past 15 years irrigated acreage in Arizona, California, and Nevada has increased by more than one-half, primarily through electric pumping. In California nearly three-quarters of all irrigation water is electrically pumped. Underground water tables have dropped markedly, and it is recognized that pumping is an inadequate answer to the increasing problem of supply. Under the sharp spur of necessity, large new conservation projects are being advanced. The most comprehensive development of water in California can be achieved if our government and private agencies willing and able to share the financial burden become working partners in these projects.

Partnership is not a new concept here in the West. In the course of irrigation and water storage development in my own company's service area, a pioneering partnership arrangement grew up between us and irrigation districts and other government agencies, going back to World War I. In some cases the company has installed power plants at the water conservation projects of these public agencies and has paid for the use of falling water for generation. In other instances the company, by contracting to purchase the power output, has helped finance construction by assuring a market for the power generated by project plants. A current example is our cooperation to help finance the Tri-Dam water storage project of two irrigation districts through a 50-year agreement for company purchase of power from the project plants. Aside from our cooperative participation in water development, we have 57 reservoirs of our own with a storage capacity of nearly 1½ million acre-feet of water, which is used not only for power generation but also for irrigation and other beneficial purposes in the Central Valley.

REA Cooperatives Minor

Rural Electrification Administration cooperatives are a minor factor in California, Arizona, and Nevada. Among the more than 1000 cooperatives in the United States there are only 16 active organizations in the three states, and in Pacific Gas and Electric Co. territory there is none. The reason there are so few is that the major work of extending electric service to rural areas has been done by utilities of their own accord. Electricity has always been available to more farms than used it. And I have always found our low rates disconcerting to the promoters of REA's.

In California there has been no real grass-roots demand for the Federal government to go into the commercial power business. Such agitation as there has been was inspired

in Washington and has been abetted by the ambitions of a few local groups and politicians to thrust Federal power upon an unreceptive people. It must be said, however, that their clamor has been furthered by unfamiliarity in the East with conditions in the West. Water, not power, is the problem in the West. Those who have made the need for water a vehicle to promote government ownership and distribution of electric power seek to rule, not serve.

Federal Water Development

Construction of Hoover Dam on the Colorado River marked the entry of the Federal government in large multiple-purpose water development projects in the West. The concept, policies, and operation of the Boulder Canyon Project are in striking contrast with those that have since prevailed in other Federal projects.

In authorizing the Boulder project, Congress required that before any money could be appropriated, the Secretary of the Interior must have executed contracts for the storage and delivery of water for irrigation and domestic use and for generation of electrical energy. These contracts were to provide revenues at least adequate to cover expenses of operation and maintenance, and repayment, with interest, within 50 years, of the project cost, with the proviso that a longer period was permitted for the repayment of $25 million allocated to flood control.

Continued Development Required

The full realization of the potentialities of the West will require continuing development of our water resources wherever feasible, including development by the Federal government as well as by state and local agencies. Where economical, by-product electric power should be developed on these water projects in order that the cost of water and the burden on the taxpayers may be reduced to a minimum. Most emphatically, however, such power should be made to add to, and not subtract from, the project's feasibility. It should be marketed through existing power systems for maximum benefit to the project and the largest possible number of tax-paying consumers.

The investor-owned utility companies of California, Arizona, and Nevada paid a total tax bill last year of $138 million on their electric properties alone. My company paid $79 million, and on all of its operations paid $104 million. For many years we have been the largest property taxpayer in California. Also for a number of years, taxes have been the largest single item of cost in providing service to our customers. Last year taxes charged to income absorbed a quarter of every dollar of gross operating revenues. They exceeded wages and salaries paid to all operating employees by $47 million and exceeded by $46 million the dividends paid to the 217,000 stockholders whose invested savings make possible the existence of the company.

Taxation Inequities

In contrast with the heavy burden of taxes borne by investor-owned utilities, government power installations are almost wholly exempt from taxation. Those who hawk their deceptive ware of "cheap public power" cannot honestly dispute this fact. It is little wonder that, with a tremendously unfair tax advantage, the government is often able to undercut its own citizens in the marketing of power. Instead, the wonder is that so many taxpayers allow themselves to be misled.

There can be no moral justification for burdening the taxpayers of the entire nation with the construction of unnecessary, tax-free electric systems to serve a privileged few. Exempting government power installations from taxation discriminates between citizens. Further, it denies to local governments and schools the tax support they would receive if the power installations were built by power companies. Government power should be taxed equally with the investor-owned utility industry. Such taxation would end forever the myth that government power is cheap.

Federal Central Valley Project

Substantially different from the Hoover Dam operation is the Federal Central Valley Project, which lies within the service area of Pacific Gas and Electric Co. Advocates of a socialized electric industry made of it a major testing ground. Fortunately, they failed in their ultimate objective.

The Central Valley Project is primarily a water project. It was created to develop and store water in the area of plentiful supply in the northern part of the our state and to make water available to the fertile lands to the south. The project was designed also to control floods, aid navigation, and control salinity in the rich delta region of the Sacramento and San Joaquin rivers. Power plants at the project's Shasta and Keswick Dams have a total dependable capacity of 300,000 kw of by-product power. Nothing in the enabling legislation, either Federal or state, contemplated that this power should be used to launch the government in a commercial power business. That, however, was no deterrent to bureaucratic policy makers who descended on California during the project's construction.

PG&E Cooperation

In keeping with our long established policy of cooperation, Pacific Gas and Electric Co. until 1951 provided a market for the CVP power near the point of generation at Shasta Dam. Our purchase there gave the project power its highest value and yielded maximum return to the project. In seven years, dating from 1944, when power was first produced, our payments discharged all operating costs and provided $38 million net toward repayment of the project costs. Had this arrangement continued, the charge for water to farmers could have been cut in half and still all costs would have been repaid within the period established by reclamation law.

Despite these advantages, unneeded government transmission lines were built to transmit the power to project pumps at Tracy, 200 miles distant from Shasta Dam. Repeatedly, we exposed the obvious purpose of bringing CVP power within range of customers served by the company and pointed out the damage that would result to the project and the water users.

This unnecessary transmission system, involving fixed charges on the additional investment, added operating costs, and line losses over a

distance of 200 miles, reduced the Central Valley Project's net revenue by $2 million a year from that realized from sale of the power near the dam.

If all firm commercial power from the project were delivered to preference customers through our system under an exchange agreement instead of being sold to the company at Tracy, there would be a further loss to the project of $2,700,000 a year.

Independent System Loss

If the Bureau of Reclamation were to build an independent electric system, complete with steam generation, as it proposed in the past, and were to sell all of its power direct, the loss would grow by another $2,400,000 a year.

The total loss to the project, the taxpayers, and the water users from such a commercial power operation, even if successful, would be about $7 million a year. Here, indeed, is an enlightening glimpse of the lengths to which advocates of tax-subsidized electric systems have been willing to go.

We now have before the people of California and before Congress a proposal to cooperate in the development of the Trinity River, one of the major undeveloped water resources of the state, as a part of the Central Valley Project.

Trinity Proposal

The Trinity is in the extreme north of California, and much of its water runs waste to the sea. For many years Californians have talked of and planned to carry some of that water into the thirsty interior valleys. Legislation is before the present Congress to enable the Bureau of Reclamation to bring the dream to reality by a system of dams and tunnels through the Trinity Mountains. By-product electric power would be developed to help finance the water project. The Bureau estimates the over-all cost at $219 million, including power facilities to be built and operated by the Bureau.

Pacific Gas and Electric Co. more than a year ago offered to purchase the falling water of the Trinity Project and to build and pay for the power facilities in a partnership arrangement with the Bureau. Early this year we made such a proposal formally. A month ago the House Committee on Interior and Insular Affairs, after the appearance of company representatives, amended the Trinity Project Bill. The amendment enables the Secretary of the Interior to negotiate for the sale of falling water for power generation on this project.

Partnership Proposal

Our partnership proposal to the Bureau of Reclamation would save the Federal taxpayers $50 million initially in capital outlay, and we would pay $3,500,000 a year for the falling water. That amount is its full value based on the present cost of alternative steam power. We would develop half again as much power capacity as the Bureau proposes to build. Furthermore, we would pay taxes amounting to $1,400,000 a year to the Federal treasury and $1,300,000 a year to state and local governments. Over the project repayment period our payments for water and in taxes would yield $171 million more net revenue to the Federal, state, and local governments than would construction and operation of the project and its power features entirely by the Federal government.

Clearly, our participation will make possible the construction of this needed water project with the least cost to taxpayers and maximum benefits to water users.

Approximately 200 California organizations, including statewide farm and business associations, labor unions, irrigation districts, boards of county supervisors, city councils, and civic organizations, have endorsed construction of the Trinity power facilities by local enterprise. It is quite evident that the more our partnership proposal is understood by the public the more support it wins.

Presidential Reaffirmation

In this connection, let me recall for a moment the terms in which President Eisenhower reaffirmed the partnership principle in his State of the Union message to Congress last January:

"At the foundation of our economic growth," said the President, "are the raw materials and energy produced from our minerals and fuels, lands and forests, and water resources. With respect to them, I believe the nation must adhere to three fundamental policies:

"First, to develop, wisely use and conserve basic resources from generation to generation;

"Second, to follow the historic pattern of developing these resources primarily by private citizens under fair provisions of law, including restraints for proper conservation;

"And third, to treat resource development as a partnership undertaking—a partnership in which the participation of private citizens and state and local governments is as necessary as Federal participation."

Traditional American Principle

These principles should not fall on our ears as something new and strange. They are wholly in the American tradition. If they needed to be spelled out by the President, it is only because the nation has strayed so far from its historic path.

America was not built by government. It was built by the energies of a self-reliant people who long ago learned the lesson of cooperation. It was built by a people who created homes in the wilderness through log-raising bees, who pushed across the western plains in organized wagon trains, who began the reclamation of arid lands by their own efforts, constantly demonstrating their capacity to fend for themselves. Today's problems are but a projection of such experiences on a vastly greater scale.

Citizens Strengthened

Government as a partner enlarges and strengthens the abilities of its citizens. Government as a remote and bureaucratic overseer can only weaken and subject its citizens to a demoralizing control. It is not a coincidence that the only areas of potential power scarcity in the United States are those in which government has assumed to itself a dominant role.

The Administration's policy seeks to restore local powers that had been yielded too weakly and to unleash local energies for the progress of the nation. I believe an awakened people welcomes and will embrace this opportunity to regain a measure of self-direction that had been all but lost.

I am certain the electric utility industry will continue to shoulder the responsibility of cooperating to the fullest for the common good.

This year the electric industry enters the final quarter of its first century of service to mankind. Its growth has been marked from the beginning by continuing technological advance, ever-increasing efficiency in operation, steady improvement in service, and continued reduction in real costs to our consumers.

My own experience of 43 years began in the period when the automobile and the airplane were just beginning to be significant factors in our civilization, and when our industry was making its first great forward surge. Many of the wonders of the electrical age that are commonplace today were only dreams then.

New Area of Development

Now we are working in a new area of development — nuclear power— which promises in this next quarter century to unfold as a further remarkable achievement of our industry. We also are investigating anew the potentials of harnessing solar energy for beneficial use.

Less than ten years ago the possibility of applying nuclear energy to commercial generation of electricity still was in the realm of laboratory speculation. Today the industry is moving ahead rapidly in the search for means to make it economically competitive with conventional methods of generating power.

Conventional Plant Efficiency

We are mindful, however, that the efficiency of conventional plants is improving, and that when and if atomic plants become economically feasible, in perhaps ten years or so, they must compete with the more efficient conventional plants of that day. The latter will continue to be an important source of new generating capacity for the foreseeable future.

Cost and operating data which can be obtained only by construction of large plants will be necessary for evaluation of the economy of nuclear-electric plants. As most of you may know, my company has been engaged with others in the study of nuclear-electric power since early in 1951. Our Nuclear Power Group has made a proposal to the Atomic Energy Commission to construct a 180,000-kw nuclear power plant. The plant would be owned by the Commonwealth Edison Co. and would be a part of its system. Details of its financing are well advanced. It will be built without government subsidy. Other companies are making similar progress in this field. We believe that if nuclear power does become competitive, it will fit into existing integrated power systems in the same manner as new and more efficient conventional plants are added today.

Senior Citizens Experiences

Those of us who are becoming senior citizens in the utility field have passed through some exciting and occasionally trying times in the past quarter century. We have experienced war, depression, attempts at planned economy, inflation, and the incessant attack of the socialist ideology on our industry. We have been a whipping boy for cranks, crackpots, demagogues, and even men in high office. We have navigated some heavy seas.

I am confident that our own achievements and our diligence in doing our job of public service have brought us through this period stronger in character and higher in public esteem.

As we look to the future we can't help feeling that today we may be witnessing, along with our own lengthening shadows, the advancing twilight of the threat of socialism. The siren song of the promiser of pie in the sky no longer is on the Hit Parade. There is heartening evidence of a public reawakening to the realities of the facts of American life. Young applicants for employment today seem less preoccupied with the adequacy of our pension plans and the state of our vice presidents' health, and more interested in the opportunity for solid advancement based on individual effort. There is a rebirth of faith in the wisdom of our forefathers, renewed pride in our American philosophy, our creed of individual dignity and integrity, and in the accomplishments of men who have forged our nation's history.

Tennessee's Contribution

Two contributions to our national life from the State of Tennessee hold considerable current public attention. I submit that for future generations of Americans, the better yardstick of the two, by far, is Davy Crockett.

Seasonal-Hazards Material Available

THE electric industry's ten year record of electric shock and burn fatalities shows a consistent pattern as to the causes of the accidents which have such unfortunate results. A need for action to combat hot weather hazards is emphasized by the fact that the same proportionate number occur to linemen each year and the same proportionate number occur during the warm summer months.

Again this year, a complete package of seasonal hazards tie-in material has been prepared by the Institute's Accident Prevention Committee. These materials consist of leaflets, posters, and letters to foremen aimed to direct attention to the practices and procedures which provide the greatest protection. Many companies have used and distributed widely, particularly among linemen, this material which emphasizes the need for job planning, teamwork, and individual safety consciousness.

Special types of drinking cups are being made available imprinted with ten special slogans designed to fit in with the leaflets, posters, and letters. Information concerning these cups as produced by the United States Envelope Co. as well as ordering instructions may be obtained from the Institute.

It is believed that the use of the seasonal hazards material can prevent accidents to men in electric utility operation. Its distribution to employees can serve to remind them of every pole top hazard, particularly during the summer months.

A price list and order blank for the seasonal hazards materials is available from the Edison Electric Institute, 420 Lexington Ave., New York 17, N. Y.

Competing Agencies of Regulation—A Reappraisal

By Richard Joyce Smith
Partner, Whitman, Ransom & Coulson

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 14, 1955

GREAT debates on the regulation of public utilities in this country have usually followed in the wake of dramatic technological advances in a particular type of utility service.

The first great debate concerned control of the railroads following their sweep across the country in the 1870's Out of that debate came the State Railroad Commissions and, in 1887, the Interstate Commerce Commission.

Another series of debates arose in the first decade of the present century when the gas and electric distributing companies and the street railways were in the early stages of pronounced expansion. These debates were on the question of more corprehensive regulation by the individual states. As a result, the old Railroad Commissions of many of the states were streamlined into the modern Public Service Commissions with broader powers to regulate the newer types of utilities.

Railroad Regulation

In these early debates, the question of Federal versus state control did not arise except in the case of the railroads. Even there, the first important constitutional issue decided by the Supreme Court concerned the scope of the authority of an individual state to regulate railroad rates. It was only when the railroads developed into a national system of transportation that Federal rather than state regulation was established.

During this early period, it was generally conceded that the control of what were known as "local" utilities, that is, those engaged in providing gas, electric, water, and trolley service, was exclusively a function of the individual state.

As the telephone developed in the early 1900's, it, too, was a strictly local utility. Its business was primarily to provide communication among the houses and stores in settled communities. Despite the magnificent development of the long-lines telephone service in this country during the past 25 years, and the later flowering of the Federal Communications Commission, the telephone business has retained much of its character as a local utility and the State Commissions still exercise predominant authority.

RICHARD JOYCE SMITH

At the stage was being set for the great debate of the 1930's, the gas companies, rather than the electric companies, produced the first inkling of the conflict. The beginnings of natural gas transmission produced several cases concerning the rights of the State Commissions to control the transmitting companies, notably the decision of the Supreme Court in *Missouri* v *Kansas Gas Co.*, 265 U. S. 298. But decisions that gas transmission crossing state lines was immune from state control did not change the generally accepted view that the gas business was strictly a local enterprise. Those decisions were certainly not considered to call for Federal control of the gas industry.

The gap became the "Attleboro gap," rather than the "Kansas gap," because the expansion of the electric utilities was more widespread and more dramatic than the growth of the gas business. The gas business was still the *gas light* business—when people were already talking about the electric *power* industry. Moreover, the potentialities of the new power, and the ever increasing capacities for generating and transmitting the power, not only fired the imagination of the American people, as the railroads had done a generation before, they also attracted capital—and they spurred on the engineers to endeavor to make the wonders of electricity more real than ever.

As early as World War I, rapid engineering developments in the power industry in this country had already provided a new, major national resource which was the envy of other nations. It was this dramatic technological expansion coupled with the enlarged corporate organizations for managing the expansion that gave impetus to the drive to have the Federal government assume primary responsibility for control of the electric power industry as it had in the case of the railroads.

Part of New Deal

As we all know, the debate on this question was in many respects a major development of the populist movement known as the New Deal, just as the debate on controlling the railroads after the Civil War had been the keynote of the Granger movement in the middle west. But there was an important distinction in the two situations. The movement for the initial state regulation of the railroads came when there was a practical absence of any regulation. The succeeding movement for the assumption of control by the Federal government arose when, in actual operation, the railroad systems of the country had been forged into a national system of transportation. The debate over Federal control of the power industry in the 1930's came at a time when, for most practical purposes, regulation by individual states was effective or could readily be made effective and when, de-

spite the growth of interstate transmission, the operating units of the power industry were state rather than National or regional enterprises.

The facts of *Public Utilities Commission of Rhode Island* v *Attleboro Steam & Electric Co.*, 273 U. S. 83, decided in January, 1927, bear out this distinction. As early as 1917 Narragansett Electric Lighting Co., the local electric utility serving Providence, R. I., and fringe territory had made a contract to supply to the Attleboro Steam & Electric Co., the local electric utility serving Attleboro, Mass., and surrounding districts, all the electricity required by the latter company. The Narragansett Co. agreed to transmit the electricity from its generating plant in Rhode Island to a station of the Attleboro Co. in Massachusetts where it was to be metered. The contract was filed by the Narragansett Co. with the Public Utilities Commission of Rhode Island. That Commission authorized the special rate involved.

Commission Hearings

For some time, the contract was performed apparently without any trouble. Then, in 1921, and again in 1924, the Narragansett Co. tried to get an increase in the contract rate by filing a new special rate with the Rhode Island Commission. The Rhode Island Commission held hearings and decided that the rate under the Attleboro contract was unreasonably low, and unfair to Narragansett's other customers, and that the increased rate should be approved. The Commission's order was appealed by the Attleboro Co. to the Rhode Island Supreme Court. That court held the transaction between the two companies to be in interstate commerce and declared the Commission's order invalid as an unconstitutional burden on that commerce. The Supreme Court affirmed the decree of the Rhode Island Court on the authority of its decision in the *Kansas Gas Co.* case, to which I have already referred.

Irony of Salient Facts

As we look back over the turbulent years that followed the *Attleboro* case, the irony of the salient facts of that case is striking. In the first place, the gap was created not by any abdication of authority by a State Commission, but by the argument of a private utility company in a dispute with another private utility company. Secondly, at the outset of this contract between the companies, it had apparently been conceded that the Rhode Island Commission had some degree of authority over it. Finally, the lone dissenter in the Supreme Court was Mr. Justice Brandeis, one of the great supporters of Federal control of the railroads. He said the problem in the *Attleboro* case was "essentially local in character" and the order of the Rhode Island Commission solving the problem was clearly valid as an exercise of local police power in a manner that did not violate the Commerce Clause of the Federal Constitution. Mr. Justice Brandeis saw no reason for distinguishing the situation in the *Attleboro* case from the *Pennsylvania Gas Co.* case, 252 U.S. 23, which had upheld an order of the New York Commission fixing rates for the sale of gas piped from Pennsylvania and delivered directly to consumers in New York.

The alignments in the *Attleboro* case were paradoxical. Disputing companies of the power industry brought about a decision of the Supreme Court which was to become the watchword of the proponents of extended Federal control, and this decision was opposed by the one member of the Supreme Court whose disciples were soon to be among the most articulate supporters of Federal control.

Created Exaggerated Concern

The *Attleboro* decision created an exaggerated concern over a gap in the regulation of the power industry, far beyond any that had been expressed over the gap in the regulation of the gas business that had been created by the earlier *Kansas* case. But, even so, there seemed to be no immediate claim that the power industry had become a national system like the railroads, calling for comprehensive Federal regulation, such as was set up for the railroads under the Interstate Commerce Act.

In a memorandum which I submitted to the Interstate and Foreign Commerce Committee of the House of Representatives in 1932, when I was acting as its Special Counsel under Dr. Walter M. W. Splawn, in the study of public utility holding companies, I said: "The (Light and Power) industry is no longer strictly local because of the increasing number of interstate transmissions and because of the superstate business organizations which have been created by the development of holding companies. On the other hand, the industry is not immediately to be defined as national in scope because its primary and fundamental activity is still local community service through the media of domestic distribution units."

A young instructor at Harvard, Hugh Langdon Elsbree, who later became a leading political scientist and a government administrator in Washington, published a book in 1931 in which he was bold enough to say: "It is very unlikely that Federal regulation of the entire interstate transmission of electric power will be seriously considered in the near future." Professor Frankfurter (now Mr. Justice Frankfurter), and his colleague at the Harvard Law School, Professor Landis (who became Chairman of the Securities and Exchange Commission), proposed only that state regulation be supplemented by interstate compacts among the states of a given area covered by interstate transmission.

Senator Couzens' Reaction

The first significant Congressional reaction to the situation came from Senator Couzens who introduced a bill to amend the Federal Water Power Act so as to give the Federal Power Commission extended authority over companies engaged in interstate transmission. But his bill was, itself, based upon the thesis that Federal control should, at most, supplement state regulation. It provided that rates even for strictly interstate transmission should be fixed by a joint board to be composed of one representative from each state in which the power was produced or consumed.

After the 1932 Presidential election, the discussions concerning the Couzens bill were merged with the broader agitations for Federal control of all business which had become the basic objective of the New Deal. This agitation culminated for the power industry in the Federal Public Utility Act of 1935.

Still a Supplement

It is interesting to note that even then with the trend for centralized economic control at its zenith, the new Federal statute still was viewed as a supplement to, rather than a substitute for, state control. It was proposed simply for the purpose of closing the "Attleboro gap" in regulation.

Commissioner Seavey of the FPC testified before the House Committee that "It (the New Title II) is conceived entirely as a supplement to, and not a substitute for, state regulation. Federal action is limited to those subjects that can effectively be handled only on a national scale." This view was endorsed by the State Commissioners, who proposed specific amendments to eliminate any possible overlapping of authority and to insure against any weakening of the regulatory powers of the states.

Substantial Acceptance

The changes proposed by the State Commissioners were substantially accepted by Congress. The Senate Committee reported that the revised bill was designed "to assist the states in the exercise of their regulatory powers, but not to impair or diminish the powers of any state commission." The same report stated in unequivocal words: ". . . The revision has also removed every encroachment upon the authority of the states. The revised bill would impose Federal regulation only over those matters which cannot effectively be controlled by the states. The limitation on the Federal Power Commission's jurisdiction in this regard has been inserted in each section in an effort to prevent the expansion of Federal authority over state matters. . . ."

The House Committee was even more insistent upon language to carry out this objective, and the bill that finally came out of conference and was enacted into law in August, 1935, was reinforced by the clearest possible evidence of its limited purpose.

FPC Administration

The FPC began forthwith to administer Title II of the 1935 Act, which dealt with interstate transmission of power. But there still was no hint of what was to come. Shortly after the act was passed, Commissioner Draper addressed a convention of State Commissioners on the scope of the new legislation. He said the new act was one of "assistance" to state authorities and was based "upon the sound assumption that the power industry is primarily a local industry and that the primary regulation of this industry should vest in the state." He was confident that this assumption would be faithfully observed because two members of the FPC had been State Commissioners and a third had been a member of the New York Power Authority, while the remaining commissioners hailed, as he phrased it, "from that section of the Nation, south of the Mason Dixon line, which, steeped in the traditions of the rights of states, has never been known to tolerate without protest, any encroachment upon them."

Commissioner Draper apparently did not foresee how virulent the new type of Potomac fever was to become, nor how it was soon to ravage the hearts and minds of judges as well as congressmen and administrators.

At any rate, it became clear that a Trojan Horse had been moved into the area of public utility regulation. In proceedings to control accounting procedures, or to compel the submission of a securities transaction to its scrutiny, or to maintain a jealous guard over its statutory power to regulate the rates for interstate transmission, it was painfully evident that the new FPC would ignore the underlying thesis that the act was merely to supplement state regulation.

Technicality Claims

In case after case, the Federal agency's claim was based upon the merest technicality. It is not necessary for this discussion to take up those cases in detail. It is sufficient to observe that the FPC's claims for jurisdiction on the basis of very tenuous concepts of interstate transmission were almost uniformly upheld by the courts. It is true that in the *Connecticut Light and Power Co.* case in 1945 the Supreme Court remanded the matter to the Commission under circumstances that indicated a tendency to pierce the veil of technicalities and require a finding of substance on whether the company was, in fact, essentially local in character. There were also some few decisions of other courts, such as that of the U. S. Court of Appeals for the District of Columbia in *Border Pipe Line Co.* v *Federal Power Commission,* which refused to accede to the Commission's self-aggrandizement. But such expressions of judicial wisdom were few and far between. Against them must be ranged the decisions of the Supreme Court in *The Jersey Central Power & Light Co.* case in 1943, and in the *Public Utilities Commission of California* case ten years later, as well as the decisions on gas companies which received gas from interstate pipe lines. These decisions gave to the Commission all the authority it needed to follow a policy of extending its jurisdiction on its own motion.

Duplicating Regulation

The net effect was to permit the FPC to embark upon a program of duplicating regulation, completely at variance with the objective of Congress in passing the 1935 Act, and wholly beyond the necessities for closing the gap created by the decision in the *Attleboro* case in 1927.

Looking back at those controversies, one may wonder how both the courts and the FPC could have proceeded along so radical a deviation from the ostensible purposes of the act. Perhaps in many cases it was an almost subconscious reaction. The controversies arose at a time when the Federal courts were granting greater autonomy to the agencies of the Federal government. The administrative body's own definition of the scope of its authority was being given more weight than ever before. And the idea of broad centralized economic controls was certainly the predominant point of view.

The regulation of the interstate phases of the power industry was a part of a general governmental program which encompassed increasing control over all business. With the TVA introducing a new kind of *in terrorem* governmental competition; with the Rural Electrification Administration engaged in activities that were frankly directed toward an ever expanding sphere of public ownership; with members of the Public Utilities Division of the Securities and Exchange Commission seemingly dedicated rather to the dissolution than to the simplification of holding company structures; and to the dismemberment rather than to the integration of operating units, the reach of the FPC into the sphere of local electric utilities could not be considered exceptional.

Wonder of Survival

The wonder is that the power industry has survived this general attack. But survive it has and the question now is how can regulation be made more rational and less punitive in the years that lie ahead.

I have always believed that no matter how exacting might be the administration of regulatory laws, the power industry, because of its intrin-

sic resilience, could survive and continue to grow, if the administrators of the laws were determined merely to regulate and not to destroy. If that is a correct assumption, I suppose the desired result could be achieved by the same administrative fiat which was used so effectively to the contrary twenty years ago. Moreover, there can be no doubt that more recently, the FPC has been recognizing the practical necessities for limiting its jurisdiction, even after the courts have, as in the Phillips case, construed the Natural Gas Act to give it much broader authority than most people, including the Commission, itself, ever thought it had.

Present Disposition

The exploratory talks that have taken place under the auspices of the FPC itself during the past year, in which the Edison Electric Institute has taken an active part, undoubtedly show a present disposition to avoid duplicating state controls, and to observe more carefully limitations on its own authority. However, in the light of the present technology of electric power, almost any phase of the industry could be brought within the ambit of Federal regulation by future administrative activities based on the present law. In short, the only way to check Federal control seems to me to be by further amendments to the law which define within the framework of the statute itself the precise procedure for exempting local utilities from Federal regulation.

Future Effect

Would this be effective against the deliberate attempt of some new group of Commissioners in the future to extend their administrative domain? If the admonition of Mr. Justice Brandeis that the power companies were essentially local in character could be ignored in an era when his dissents had in most other respects become the new gospel, and if the categorical statements of the responsible Congressional Committees concerning the limited scope of the Federal Power Act had less influence on the courts than the actual exercise of authority by the FPC, it may seen too naive to suggest that even a new Act of Congress could curb the power of a Federal agency intent upon its own expansion.

And who is to say with any confidence that at any given time Congress will be disposed to restate with renewed emphasis its original purpose? We know that in 1947 the Congress rejected an opportunity to do so. The failure then appears to have been due to the ability of the embattled FPC to convince the Congress that the proposed amendments would, in effect, have repealed the Federal Power Act. This overstatement, coupled with the testimony of Commissioner Olds that it would be wise actually to extend certain controls to the entire industry, may have given enough members of the Congress the impression that the objective of limited Federal control had become obsolete and that the evolution of extended control through the FPC's own activities ought not to be arrested.

On the other hand, in 1953 Congress did add a new subsection to Section 202 of the Federal Power Act to exempt a company transmitting electric energy to a foreign country, and by the Hinshaw Amendment to the Natural Gas Act in 1954, delimited the authority of the Commission over a local utility receiving gas from an interstate transmission line for ultimate consumption within the state in which the local utility carries on its activities.

Congressional Review

Perhaps the recent amendments do mean that Congress is now ready to undertake a more comprehensive and courageous review of the whole relationship of state and Federal controls. The pending debates over the Harris Bill and similar proposals to exempt natural gas producers from Federal control could lead to just that comprehensive restudy of the problem. The fact that local gas companies are now ready to rely on the FPC for protection against escalating charges in contracts between producers and transporters of gas, may go a long way to dispel the feeling that there must always be a cold war between the FPC and the local utilities. Likewise, the clearcut establishment of Federal control over the rates charged for interstate transmission of power should convince both State Commissioners and the industry that integration of both Federal and state regulation is needed.

This integration, in my opinion, cannot be achieved under the highly technical claims of jurisdiction the FPC has made in the past. It must be based upon an acceptance of substance rather than form as a guide to jurisdiction. The FPC must have the authority and must be in a frame of mind to exercise authority to relinquish control over those phases of any particular situation which, though perhaps techincally interstate, are practically and substantially part of a local business.

Pattern for Integration

Is there any pattern which might aid the Congress in seeking this integration? Strangely enough such a pattern does exist in the Public Utility Holding Company Act, which was enacted along with the new Federal Power Act in 1935. The declaration of policy in the Federal Power Act contained the general statement that "such Federal regulation (is) however, to extend only to those matters which are not subject to regulation by the states." Such general declarations have not prevented the Commission from extending its authority over local utilities. The Public Utility Holding Company Act, on the other hand, established in its Section 3 a clearcut statutory procedure whereby the Securities and Exchange Commission is required, unless it finds some supervening national interest to the contrary, to exempt from the regulatory requirements of the act intrastate holding company systems, companies that are only incidentally holding companies, temporary holding companies and holding companies whose systems are outside the United States. This procedure, in contrast to that in Title II, contemplates that the Federal administrative agency charged with the regulation in question must make a quasi judicial determination of an application for exemption. It is given a power of exemption which, in the proper case, it must exercise.

SEC Administration

To some extent the SEC in the early years of the Holding Company Act, strained over the curbs it was required to place upon itself under Section 3; and as a result, compelled some systems realistically intrastate or incidental, to submit to its jurisdiction. On the whole, however, the administration of Section 3 exemptions by the SEC has been sound and in keeping with the purpose of Congress. It seems to me to have demonstrated that where Congress gives the Federal agency the positive responsi-

(*Continued on page* 255)

Electric Utility Problems in the Pacific Northwest

By Kinsey M. Robinson

Chairman of the Board and President, The Washington Water Power Company

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 14, 1955

THE Pacific Northwest is still a giant, rugged land. Our Pacific Northwest power pool covers some 800,000 square miles, embraces 190 power plants and 11 water sheds. If you like the outdoors, mountains, lakes, and streams, the Pacific Northwest offers relief from strenuous existence elsewhere. If you live in the Middle West or East, you have a speaking acquaintance with our annual harvest of lumber, wheat, silver, aluminum, salmon, apples, and bright young men, as well as a few whose brilliance might be questioned.

The Pacific Coast states lead the nation two - fold in population growth. Crowded outside areas are constantly sending us people who seek new opportunities and who will build themselves homes. Some of you are also sending us a share of your taxes.

Federal Ownership of Land

First, I shall confide several things about which you may or may not be aware at this moment. For example, the Federal government remains a powerful entity in our rapidly growing Northwest. Some 63 per cent of land in Idaho is Federally owned, as compared with only 1 per cent in Illinois; 35 per cent in Washington, with but 2 per cent owned in Iowa; 54 per cent in Oregon, 32 per cent in Montana, and 72 per cent in Utah, with only 1 per cent owned in Indiana, and so on.

Nor must we overlook the fact that the strong hand of government holds the strings of some 50 per cent of electric power generation in the Northwest, with considerable more in the hopper. That is what I referred to in part previously when I said that some of your tax money, like the prodigal son, wanders away from where it was raised. The hundreds of millions of dollars already spent or scheduled for power development in the Pacific Northwest by the United States government is your contribution to our development. The over-all amount includes such items as $287 million for the McNary power development; $348 million for The Dalles; $102 million for Hungry Horse. Incidentally, the Hungry Horse project was originally estimated at $39 million, but true to form, a later figure placed the total cost at over $109 million; $186 million for Chief Joseph; $31 million for the dam and power house at Albeni Falls, not to mention the $556 million already spent at Grand Coulee, with $184 million yet to come.

KINSEY M. ROBINSON

So please accept our gratitude. If you are willing to pay the fiddler, surely the Northwest can be expected to carry on with the dance. Your taxes, and some of our own, have contributed to ponderable expansion of military bases, aluminum production, reclamation, enormous contracts for airplanes and ships, and other military materials too numerous to mention. But please don't think the millenium has arrived. There is still more to talk about.

It is extremely difficult when called upon to describe a section of this great land, America, to set limitations and bounds to subject matter. In the fields of geography, people, industry, climate, culture, and so on, the Pacific Northwest has its own peculiar history and forward trend. But other sections of America show progress, too. And in the Northwest we puzzle over the same questions that confront you—our growing tax load, power supply, government spending, government mired deep in private business, tight corporate budgets which must not curtail service to the public, atomic development, and many other problems that perhaps cannot be solved today.

Northwest Utilities' Dilemmas Many

It would take a sizable book to list the large and small dilemmas that move across the average utility official's desk each day—yours and mine. If a prize were offered for the longest list, and with all due respect for our friends in other parts of the nation, we in the Northwest would at least receive honorable mention. It has been said that we in the Northwest are in the front lines of a world conflict. The Sword of Damocles hangs sharply over the head of Private Enterprise. You have my word for it: We *do* hear the same whispers of revolt, and we are also in a position to watch the careful hand of strategy which, if not placed under control, can someday destroy the very foundation of American Liberty. And now I want to emphasize the seriousness of this situation. We in the electric industry are passing through an extremely critical span of

years, and I want to share my concern with all of you.

It may seem paradoxical at the outset to report that where five years ago three major utilities in the Pacific Northwest were earmarked for the collectivist d r a i n p i p e, and seemed doomed for public power (I may add that in two instances the contracts and bonds were reportedly printed and signed), I say it is gratifying that these three utilities—Pacific Power & Light Co., The Washington Water Power Co., and Puget Sound Power & Light Co.—are stronger than ever before. Other utilities in the Northwest, such as The Montana Power Co., Idaho Power Co., Utah Power & Light Co., and others which have not been caught by the tentacles of public power also report spectacular gains.

Power Use at All-Time High

It is interesting to note in this mention of growth, that kilowatts now consumed by the customers of the several Northwest companies stand at an all-time high. Washington Water Power, for example, has an average consumption in the residential field of over 7,100-kwhr annually. In order to care for the extreme customer enthusiasm for electrical living, several of our towns have adopted into their wiring codes the requirement of a 200-amp meter socket with entrance facilities to match. We call it expandable wiring. Practically all of Washington Water Power distribution lines have already been cut over to 13,000-v, and we are now talking of 22,000-v distribution systems.

Increased Power Use Creates One of Two Principal Problems

On the debit side of the ledger, I surmise that you have heard that one can be killed with kindness. And I must tell you that this sharp upward curve, this unprecedented growth of power use in the Northwest, is the very thing that creates one of our two principal problems. And I must confess that unless these problems are solved, we face more than the ordinary brand of trouble. What once happened to the giant mammoth, the bones of which were located in a lava bed recently, could easily happen to us. We in the private utility business in the Northwest could become extinct. Let me explain what I mean.

Back in 1940, the Pacific Northwest needed 900,000 kw of power, a good start for any growing area in its first long pants. Five years later the need for power had jumped to nearly 2½ million kw. By the mid-1950's, power needs had practically doubled the 1945 level, to stand at 5½ million kw. Today, our engineers are doing some fine head-scratching about the year 1964, when they predict that the Northwest will require 14 times the 1940 figure, or a minimum of 13½ million kw. To an area that has primarily relied on hydro for electric generation, and which must contrive to harness the nation's most wild and turbulent rivers, all costly, all involved in conflict of one kind or another, 13½ million kw is hard power to come by.

The demand for electric energy comes faster than we can dam our rivers and build power plants. We think of past experience in the matter of shortage, when business firms were asked to curtail and the entire power pool threatened collapse and disaster. We think of our industries, stockholders, employes, and our customers, with payrolls down and products idle on the line; and the $64 question in the Pacific Northwest is this: How can we keep ahead of demand? How can we avoid the irreparable damage that must follow a failure to meet these rapidly growing needs for power?

There was a time when the Federal government held in its paternalistic hand the answer. Said the government: "Let us do it. Let government provide power generation for the whole area." But the result was more and more difficulty. Those bleak days of Federal responsibility proved to most of us that the government is not the answer to power development. We were much worse off than ever before.

As you know, in Oregon and Washington we have the Public Utility Districts. We in the Northwest must also bear up under a preference clause in the Bonneville Act. This act, as many of you know, gives to the PUDs and other public bodies a seat at the banquet table, with all the power they can consume, while private utilities are permitted only the crumbs from the table when there is surplus power to bargain away.

It seems not to matter that taxes paid by the private utilities helped to build the Federal dams in the first place. We paid the taxes only to come out with no future claim on what those taxes provided.

It is estimated that the entire output of Federal hydro plants will be consumed by cooperatives and other public agencies within a period of ten to 15 years. All of these expenditures of your tax money and ours for Federal dams will do private utilities little good, you may be sure.

Varied Problems Face Power People

We in the power business are also confronted with license objections, fish and wildlife problems, legislation in many forms, water storage with its upstream and downstream benefits, and much else besides. In fact, power analysts and consultants have listed some 75 individual situations which must be resolved before many power projects now under consideration can be consummated. So again I must admit that in the Northwest the millenium has not arrived.

Discussing this talk with some of my associates the other day, I was chidingly told that after listening to my story, there would not be a dry eye in the audience. Everyone should be sorry for the Pacific Northwest. But that is farthest from my mind. We believe we have found the solution. It is not new. It was ours in years gone by. It is simply this:

Not Federal Responsibility

The Federal government should never assume the responsibility of supplying the electric energy requirements of any area. Therefore, private utilities individually and jointly must explore every possibility to meet growing needs for electric energy. I am convinced that the electric industry, which was envisioned by private business men as having magnificent possibilities for service, and which was nursed to maturity through long and difficult years, cannot now afford to sit idly by while a noisy group of political power promoters demand exclusive rights in the development of our power resources. Our situation demands that we proceed to meet our power needs in a most vigorous and

progressive manner. We must do this not only to satisfy a ravenous consumer appetite for electric energy, but also that we may survive as an essential bulwark in America's future growth.

If we build these plants, we will use them to promote progress and stability. We pledge ourselves to this public trust, and that's the way it should be.

At this time, it is my pleasure to endorse the partnership policy of the present administration in the field of electric power. This policy actively encourages the development of the natural resources of the country, and there is no mistake about that. It differs from New Deal and Fair Deal power policy which advocated by word and deed the nationalization of electric power. The present partnership plan can be a real stimulus to prosperity. It includes the states and local communities, private citizens, and the Federal government, all working together. It is not a policy of monopoly by any one of these groups. The job to be done is so great that all parties are urged and expected to participate. Future generations may well regard the present administration with deep appreciation because of the courage it has shown in stemming the tide toward nationalized power. Now, for the first time in over 20 years, the door has been opened to local interests, and it is again our privilege to go forward.

Partnership An Incentive

With the partnership idea as an incentive, never before has there existed the serious, deliberate effort, wherein all groups involved are reviewing as objectively as possible our potential power situation, which we see today. Much of this work has been done under sponsorship of the Pacific Northwest Governors' Power Policy Committee, which includes representatives of all major public and private agencies as well as the Federal government. Another influence at work has been the Columbia Interstate Compact Commission, the official group representing seven Northwest states and the Federal government. This group has written the terms of a compact which now awaits ratification by the legislatures of the respective states and the national Congress. In addition, there is a study and operating group called the Northwest Utilities Conference, made up of operating utilities both public and private, not to mention many combinations of a smaller nature and the efforts of individual utilities. Some of these latter I shall touch upon.

Examples of the partnership principle at work are not difficult to find in the Pacific Northwest. A bill introduced in Congress by Representative Coon of Oregon in March of this year would authorize the John Day dam on the Columbia River, costing some $310 million. Though the U. S. Gevernment would retain title to the development, and Army Engineers do the actual construction, it is proposed that three private power companies and any others, if they care to participate, will advance $273 million of the total estimated cost.

Advantages of Bill

We believe the bill offers a sensible, definite, and practical way to get new projects under construction without loss of time. In addition, huge amounts of money can be saved the taxpayer. It is estimated that within six or seven years, under this arrangement, power from the John Day would add to the supply of the Northwest power pool, and within a period of eight or nine years the entire 1,105,000 kw would be available. Taxes paid by the organization representing the three private companies over a 50-year period would be two to three times the money put up by the Federal government to build the non-reimbursable navigation and flood control part of the project. Participating companies would recover their investment by power supplied from the project over a 50-year period. Because this proposed project would utilize the fullest concept of partnership, and because it does not violate the comprehensive approach to the region's water resources program, or should it open up a dispute between public and private power interests, it should receive full support from reasonable minds. But we can be sure that everyone will not be reasonable.

Another example of partnership at work is Pacific Power & Light's offer to proceed in the Green Peter development of 96,000 kw on the South Santiam River in Oregon. The government would take care of non-reimbursable costs such as flood control, navigation, etc., and Pacific put in the generating facilities. This development can be properly classified as a desirable multiple-purpose project.

Also very recently newspaper headlines carried the story about a tentative offer made by The Montana Power Co. and Pacific Power & Light Co. to build and operate power facilities at the proposed Yellowtail Dam on the Big Horn River in Montana. In a letter to the Interior Department, the companies estimated the partnership arrangement would mean savings and other benefits to the government, totaling $75 million.

Some publicity has also been given to the newly organized group called the Pacific Northwest Power Co., which is made up of The Montana Power Co., Pacific Power & Light Co., Portland General Electric Co., and The Washington Water Power Co. This group is currently investigating the feasibility of two power sites on the Snake River, below Hells Canyon, called Mountain Sheep and Pleasant Valley, in Idaho and Oregon. According to the engineer's timetable, this million kilowatts of power could be on the line by 1960 and 1961 from these two projects, if they are permitted to go ahead.

Need Permission to Proceed

Feasibility of another site on the Clearwater River in North-Central Idaho is also being investigated by the four-company group. In each instance, and this is also true of Idaho Power Co. proposed developments on the Snake River, investor-owned utilities are prepared to move quickly. Financing is not a major concern. We have been assured that money will be made available. We only ask that permission be granted to move ahead.

All in all, private utilities in the Northwest either are building or they are giving consideration to some 45 new hydro-electric projects. We contemplate about 3,700,000 kw of new power in the next few years. In addition to the projects that may participate in the partnership idea, several of which have already been mentioned, Washington Water Power is making progress on a 400,000-kw hydro plant at Noxon Rapids, on the

Clark Fork River above Cabinet Gorge, in Montana. The Federal license has already been granted. This plant will cost some $85 million and should produce power by 1959. Pacific Power & Light Co. is making progress toward new development on the Lewis River, which will add another 200,000 kw.

Cites Construction Projects

Portland General Electric has several plants under consideration and is now constructing a dam on Oak Grove Creek to increase usable storage for downstream plants on the Clackamas River. Over in Montana, preliminary filings have been made to investigate two sites at Buffalo Rapids, each capable of producing 120,000 kw. The California-Oregon Power Co. has under construction the last two of a series of plants on the North Umpqua River. This company has also filed on the McCloud and Klamath rivers, looking toward future development of another 500,000 kw.

Puget Sound Power & Light, in addition to investigations on the Baker River, filed on the Wells site on the Columbia River, where a potential of 400,000 kw awaits development. The Federal Power Commission denied the application on the ground that subsequent filing by the Douglas County PUD should receive preference.

Progress in Nuclear Reactor Field

At the other end of the Northwest power pool, Utah Power & Light Company is adding to the Gadsby steam plant another 100,000 kw, and on and on the list goes. The tedious aspect of statistics prevents me from going into detail regarding an agreement by five Northwest private utilities with the Atomic Energy Commission to pool technical resources to study the feasibility of a nuclear reactor as a source of electric power. I may say, however, that in this field progress is also being made.

On the plane the other day, a passenger sitting beside me, and quite unaware of who I was, started the conversation about electric power. He commented that Kinsey Robinson must be crazy to become involved in so many power sites at one time. I did not identify myself for the moment but replied: "No, I don't think he's quite as bad as that. In fact, I know him quite well, and consider him a good friend. And I don't think he's any crazier than I am. What Robinson and other utility presidents are trying to do is to prepare for the future. They want to have power ready for tomorrow's needs."

Some comment should be made regarding the status of public power. I must confess that it does have some nuisance value the way politicians and the PUDs indulge in it. And this I will say without hesitation: With the entire Northwest facing serious need for power, it is most baffling to understand why small political blocs and others try so desperately to destroy private incentive. These adverse groups prove conclusively by words and deeds through the well-publicized Hells Canyon circus and other examples of obstruction and delay that they would prefer to have no power at all rather than have it developed by private enterprise. Through periods of war and in times of peace, their long-range objective never seems to waver. It is to destroy private enterprise at all costs. Nationalizing the electric power, which is on record as step number one, with other steps to follow, takes consistent priority over security or progress or harmony or truth.

Appreciates Other Fellow's Viewpoint

I have spent most of my life in the electric industry. Like most other utility presidents, I have come up the hard way. In my long experience I have worked side by side with many other utility people, finding them with few exceptions plain, ordinary, self-respecting, decent men who almost invariably placed their employes and service to their stockholders and the public above self. And through all the past years I have never been accused—at least not to my knowledge—of being blind to the other fellow's viewpoint.

I realize that we live in a complex world, and perhaps not one human mind, however brilliant, is capable of grasping and weighing the importance of countless issues that have a bearing upon existence in years to come. And acknowledging that there are diverse viewpoints regarding any and all subjects, I have attempted to be open-minded about the theory of collective ownership, and not to be too severe with the strange minds that favor it. And with this attitude, I have waited in vain for acceptable evidence to support the advantages of collective engineering, or production, or service to the public, or general prosperity in areas served. No such evidence has ever appeared.

Instead, with growing apprehension, I have watched the rise of violent emotions in men and women when they have been stirred to envy and prejudice by unscrupulous despisers of the free enterprise system, or by the politician who was seeking votes at the expense of all else. I have listened to these warped and ambitious minds urge the population toward panic, or hysteria, or fear, or hate, pointing to the managers of private utilities as enemies of the people and a hindrance to progress.

Political Power Advocates' Claims

It is claimed by political power advocates that all power should be developed and owned by the people, inferring that a rigid separation exists between themselves and all who disbelieve as they dictate. When, may I ask, did the 280 private utility managers, their hundreds of thousands of employes, their millions of investors and multiplication of supporters cease to be people? And I am curious to know why was this fine distinction of ownership not discovered in the early years of power development, when not a single refrigerator existed in America to reward the investor with load on the line; not one radio, or electric fan, or range, or sawmill, or elevator to embellish service difficulties which had never yet been solved.

Conditions in Early Days

In those early days risk capital in some instances could not be had at any price, and in other instances only with extreme difficulty. The electric business was not profitable to the politician in those days, and the socialist wanted none of it. And I now wonder when will we dare to answer these usurpers, these sudden moralists, in coin of their own realm. When will we take a united stand to search out and expose the glum and frustrated instincts which apparently have forced men into channels of envy and lust for power, and have

turned them into the predatory people that they are.

Surely others have observed that the idea of power development by the public and for the public is initiated almost invariably by a few clever minds. People as a crowd have not and perhaps never will set about to harness a tumbling river, or transform a coal mine into electric energy. People themselves, multitudes of individuals, groups or masses, never painted a picture. wrote a book, invented a cotton gin, or built a power house. It is only the individual who conceives and carries these things to completion. Furthermore, it is only under the whip of a disturbed individual's mind, using envy and prejudice as a basis, that the public falls prey to insidious reasoning that they actually did develop an electric system and should own it. They are encouraged to take from one and give to another. They usurp that which one man created by sacrifice and toil and place it in the hands of the less industrious, and often the property involved falls into most unscrupulous hands.

Confidence in Political Power Waning

While Northwest power politicians and their cohorts indicate little letup in their noisy conspiracy to nationalize the electric industry, several areas indicate that the public has less confidence in political power than existed in days gone by. Union County PUD in Oregon has voted itself out of existence. The public wants no more of it. An attempt to legislate a state PUD in Idaho failed to gain sufficient signatures to place it on the ballot. Stevens County citizens in Washington, now PUD members, have also indicated disfavor of the collectivist theory by signing a petition requesting an opportunity to vote for private utility service. Still again, in Pend Oreille County, some 80 per cent of REA customers signed a petition designed to give them an option as to whether the PUD or a private utility provides them with service.

In recent elections in the Northwest the power issue was of far less importance than schools, taxes, and the like. Three Oregon elections in 1954 voted down public power, and while Neuberger won his so-called self-styled mandate from the people with a 2,400 vote majority, the public power candidate for governor in Oregon lost by some 78,000 votes. Nor was it difficult for Congressman Sam Coon to carry 14 out of 18 counties when he stood on a platform of private power development, as opposed to his public power adversary. Congressman Ellsworth, supporting the partnership program, carried over his opponent by some 30,000 votes. In Idaho the same story can be told. Dworshak, Budge, and Smylie were all elected. The three opponents favoring Federal dam building were all defeated. Commented one newspaper as follows: "Look the Northwest votes over again, gentlemen, use your microscopes, and see if you can blow them up into any kind of mandate at all." The public is not yet sold on public power.

Further Evidence of Disfavor

Still further evidence of growing disfavor in recent years is the fact that numerous communities have protested the failure of PUDs to reduce rates. These communities have keenly felt the loss of taxes formerly paid by private utilities, and they have bitterly complained that the things which were once promised them have not been realized.

I think perhaps that none of us sufficiently capitalizes the fact that operation of utilities in private hands does now and will continue to contribute hundreds of millions of dollars toward the general costs of local and national governments. For example, in the year ending December, 1953, in the state of Washington, where a group of 21 operating PUDs paid slightly more than six cents in each revenue dollar to meet the costs of government, The Washington Water Power Co., by comparison, if I may mention that firm again, paid 25 cents, in addition to taxes paid on interest and dividends received by security owners. Nor does this take into account the large loophole in Federal income tax wherein income from interest on the obligation of PUD bonds is not subject to this tax. Surely the consumer should know this tax differential, a subject vital to the entire population. Tax-wise, private management is the incontestable benefactor. Rate-wise, and despite its heavy tax load, private management can also hold its head high.

I am inclined to predict that the road ahead will be increasingly difficult, however, unless we resolve here and now the problem of reaching our public with a more clear understanding of what socialized power can mean to them; unless we keep our customers informed. Examination of election results over the nation brings to light grave inconsistencies that must be ironed out if we are to survive. It is most unflattering to us in the electric industry to be told through the ballot box that while the public respects the productivity of private management; trusts the businessman far more than one is inclined to trust the power politician; that while the public holds strong aversion for socialism, and regards communism with open terror; that while the entire population seeks relief from its growing tax load; I say it is most unflattering that these same customers vote into office clever candidates who—claiming a mandate from the people—proceed to raise taxes by taking private business from the tax rolls; who both secretly and openly promote the cause of socialism.

Influence on Public

Step by step our customers and business allies are being led by a relentless and canny group toward nationalized electric power. Yet few of us in the industry are willing to call a spade a spade. We appear hesitant in facing our customers in assembly, on radio or television, and telling them what is going on. We all believe in the principle of expression, but are somewhat reluctant to apply the principle to action. This group of usurpers is committed to wiping out the private enterprise system, and we know it. So again, may I caution and warn this assembly that we must make greater effort to take the public into our confidence. We must in some manner learn their wants and their desires and meet them more than half way. To my knowledge, that is the only way our part of the American system can be made secure.

I have sought to give you a hurried picture of the rapid expansion taking place in the Northwest; the complicated problems connected with power supply; the failure of government to

(*Continued on page* 234)

Air Conditioning Is Big Business

By C. A. Tatum, Jr.

President and General Manager, Dallas Power & Light Company

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 14, 1955

I AM going to tell you about a revolution.

Not the usual sort of "banana republic" revolution to overthrow a government, but a revolution in the living habits of the American people. It has already begun and soon will affect almost every electric utility in the United States.

This change in living habits began when a machine which cools, dehumidifies, filters, and circulates air was offered to the public at popular prices.

The machine, of course, is the air conditioner.

Since the end of the war, air conditioning—especially for the home—has become big business. It is going to become much *bigger* business for everyone.

An indication of the future of air conditioning can be seen in some figures that I have assembled to show the tremendous growth experienced by the air conditioning industry in the last few years and a projection of what is ahead.

Retail Sales Volume

Retail sales volume of the industry for 1954 was estimated at $2 billion by Cloud Wampler, president of Carrier Corporation, and he forecasts a $2¼-billion sales year for 1955.

The sale of room air conditioners alone totaled 1,230,000 units in 1954, a 515 per cent increase in four years. Even with this rapid growth, the national saturation of room air conditioners is still only 5 per cent.

Data from the Bureau of the Census, reports from manufacturers' shipments and a compilation of industry opinion indicates that the 10 million kilowatts of weather-controlled load served by the electric utility industry in 1954 will grow to more than 55 million kilowatts by 1963.

As customer acceptance of air conditioning gains more and more momentum, we are beginning to see a spreading of air conditioning beyond the so-called "hot areas."

In 1950 the relatively cool Middle Atlantic and East North Central regions of the country accounted for 18 per cent of the total sales of room air conditioners. By 1954, these same regions accounted for 37 per cent of total sales.

C. A. TATUM, JR.

Compare this with the hot areas of East South Central and West South Central United States. Twenty-two per cent of all air conditioning sales were made in these areas in 1950 and 33 per cent in 1954.

Electrical Merchandising states that every region of the country registered gains in room air conditioner sales in 1954, with the exception of New England. The biggest increase was not in the South, but in the West North Central area where the figure more than doubled.

Possibility of Obsolescence

An official of FHA declared recently that this government agency which guarantees the mortgages on homes has a vital interest in air conditioning because: "These mortgages are for as long as 25 years, and it's quite possible that new homes being built without air conditioning could become obsolete long before that."

The American today is the most comfortable person in history. At his fingertips are the results of hundreds of millions of dollars of research and development — all directed toward making his life easier and more pleasant.

It is true that new things catch on quicker in America, perhaps, than anywhere else because we, as few other people, are dedicated to progress. For us, the present and the future are the most important tenses in our language.

Americans have a habit of making a luxury a necessity. Take the automobile today as an example: It has power brakes, power steering, automatic shift, motor-operated windows, and now even air conditioning.

The initial demand for automobile air conditioning has exceeded the demand for power steering and automatic transmission when they were first introduced, according to *Air Conditioning & Refrigeration News.*

Air Conditioned Cars

An air conditioned car is no longer a novelty. It is a salable item which the public is buying—and not just the Cadillac owners either. Fords, Chevrolets, and Plymouths with air conditioning are seen on the streets of Dallas every day.

Industry field reports for Texas showed 5 per cent of all new cars, 15 per cent of medium and higher priced models, and 45 per cent of luxury cars with air conditioning.

This experience in the automotive field is but another confirmation of the public's acceptance of air conditioning.

A recent appraisal of the air conditioning industry contained this interesting paragraph: "An average day in the life of Mr. Average American in the not-too-distant future might be something like this. He will wake up in an air conditioned bedroom, eat breakfast in an air conditioned nook, drive an air conditioned car to work—in an air conditioned office or plant. He will enjoy his evening meal in an air conditioned dining room, at home or publicly; relax in an air conditioned movie or

sit in an air conditioned living room watching a color television program originating from an air conditioned studio."

The appraisal concludes: "If this concept of an average day is thought to be too theoretical, it should be pointed out that air conditioning is today available in all the situations mentioned."

Let me say that the statement is far from theoretical. It is only a description of what is commonplace in the Southwest today, and I believe will be in the remainder of the country soon.

The air conditioned home of tomorrow is the home of today in the Southwest. Residential developments featuring $15,000 homes with air conditioning are no longer news. They are simply an answer to the volume demand for year-'round comfort.

A customer survey we conducted three years ago indicated what was ahead in the residential air conditioning field. This question was asked: "Between using equipment to keep warm in the winter, and using equipment to keep cool in the summer, which would you say is most important—or are they about equally important?"

The Result:

46.8 per cent said keeping *warm* was more important.

44 per cent said keeping *cool* was as important as keeping warm.

7.5 per cent said keeping cool was *more* important.

Air Conditioned Shopping Centers

Of course the air conditioned city may be far in the future, but the air conditioned shopping center is just ahead in our area. One is already under construction and others have been announced. Stores in these shopping centers face a covered mall or arcade which is air conditioned. The shopper may go from one store to another without leaving the comfort of air conditioning.

One shopping center will have one central air conditioning plant serving all stores and arcades. Some 2000 tons of air conditioning already has been ordered to serve this one center, and the developer says he plans to expand the installation to a total of 12,000 tons sometime in the future.

There is an aircraft plant in Dallas which has 7400 tons of air conditioning. There is an air conditioned drive-in restaurant in Houston and one in Harlingen. All you have to do is drive under a canopy and a carhop will attach a large rubber hose to your window and pipe cool air into your car while you eat in comfort.

Of course, not many people will go quite so far as a banker friend of mine who has air conditioned a dog house so his Great Dane will be comfortable during the summer.

For the air conditioning industry and for the customer, then, air conditioning is big business. It also is big business for every utility; either at present or just ahead it is a business that holds some surprises for utilities faced with serving such a fast-growing load.

Location of Generating Facilities

The effect of air conditioning on the location of the generating facilities is, of course, very important. Careful consideration must now be given to the location of new plants closer to residential areas as air conditioning gains general acceptance.

Increasing load densities in residential areas are creating new distribution problems. In Dallas we have found that it is no longer practicable to serve such loads from distribution substations spaced at commonly accepted intervals. Additional substations have been required with the attendent problems of obtaining substation sites in built-up residential areas and routing transmission lines into such areas.

Some reduction in the cost to serve air conditioning loads will come as a result of steps taken recently to increase the power factor to between 85 per cent and 90 per cent on the new models of room air conditioners. However, distribution facilities must still be greatly increased to serve air conditioning loads. We are now designing the distribution system in our residential areas to serve an average load density of 10,000 kw per square mile.

Customer Relations

This new requirement for increasing distribution system capacity calls for careful attention to the company's customer relations. Substations must be landscaped and designed attractively to harmonize with the residential area.

For many years the Dallas system peak, caused by commercial air conditioning, has come at about 3 p.m. but as the residential air conditioning load grows, there is a tendency for the system peak to move farther into the evening. For companies with a winter system peak air conditioning is, of course, a *very* favorable load. Take the residential customer, for example, who uses the national average of 2549 kwhr per year. If that customer were to buy a 1-hp air conditioner and use it for 1000 hours a year on a system having a winter peak, his annual use of electric service would increase 29 per cent without any additional generating capacity being needed by the company.

For companies with a summer peak, our studies and experience indicate that ranges, water heaters, and laundry equipment are good balancing loads. In this respect the heat pump appears to offer tremedous opportunities in the future to offset the high summertime peaks which result from refrigeration loads. Here is a device which, fully developed and mass produced, can be installed to a high point of saturation without increasing generation peaks or requiring additional transmission or distribution capacity over that required for summertime air conditioning.

Effect on Load Factor

A large air conditioning load, of course, has a very important effect on the load factor of an electric utility system. For this reason, Dallas Power & Light Co. carried out a comprehensive study of its system load factor in relation to air conditioning.

We found some rather unexpected things. Back when we had a relatively small-air conditioning load we assumed that air conditioning had an annual load factor of around 8 to 10 per cent but as a result of this study, we determined that the load factor of air conditioning today is closer to 20 per cent. Our study showed that customers get the habit of air conditioning: that is, after they have used it for a few years they tend to keep their equipment running for a longer portion of the year. Air conditioning becomes not a luxury but a commonplace necessity. The second factor which helped raise the load factor was the installation of thermostats on so many room cooler units. With the thermostatically controlled unit. the customer merely turned on the machine and left it to run automa-

tically. He didn't wait until he felt warm to switch it on.

Another unexpected result of our load factor study was that air conditioning has a diversity worth considering when plans are being made for additional plant capacity.

Preliminary reports from a study that we are now making show that a group of 1-hp air conditioners will have an average demand of about 1500 w per unit but at the time of our system peak last year on a 103 F day in July, this demand was found to be 1000 w or less per unit which indicates that only 67 per cent of the maximum undiversified load was on our system peak.

Central systems showed an average load of 1300 w per hp of rated capacity. The demand of such units, at the time of the annual system peak, was only 1000 w or 77 per cent of maximum.

Some Unexpected Benefits

Air conditioning has brought some unexpected benefits as well as problems to our company.

The residential customer has become accustomed to paying a much higher electric service bill. Quite frankly, we did have problems with high-bill complaints at first. However, after publication of cost-of-operation booklets, individual handling of high-bill complaints, and through general experience of our customers in operating air conditioning equipment, the number of complaints has steadily decreased.

I would like to suggest to those of you who will soon be experiencing this increased air conditioning load that it is highly important that the customer realize in advance of installation just how much it will cost to operate his air conditioning unit.

During the month of August, 1954, more than 3600 of our residential customers used in excess of 2400 kwhr for that month alone. You will recall that the national residential average for the *entire* year was 2549 kwhr.

Average residential kilowatthour consumption on our system has increased from 1350 kwhr in 1946 to 3053 in 1954, or an increase of 126 per cent. Our residential average in 1954 was 20 per cent above the national residential kwhr figure, and a large part of this growth can be traced to air conditioning.

Air conditioning also has had the effect of making our customers more electric-living conscious. It is a persuasive salesman of the benefits of electricity. It helps create, on the customer's part, a desire for an all-electric home with its promise of modern, comfortable living.

Promoting Better Home Wiring

Perhaps one of the most important benefits of air conditioning has been in the home-wiring field. Air conditioners of ¾ hp and over should be served with 240-v circuits. We have been driving this point home to air conditioning dealers and to our customers with good results. We have a continuing promotional program which is directed to all segments of business concerned with wiring—the contractor, the architect, the builder, real estate agent, banker, and others. We have interested these groups in promoting better wiring.

Listen, if you will, to this radio commercial which was run, not by an electric company, but by the largest bank in the Southwest:

"If you've bought an electric range, food freezer, or air conditioner recently, you may have found that you needed extra wiring to take care of these appliances. Many homes, not necessarily old homes either, are not wired for the ever-increasing demand of electric living. So, next time you add another appliance (or even before), ask your electrical contractor or dealer about rewiring your home completely. It costs very little more to do the whole job at once." The advertisement goes on to point out that such a wiring job can be financed with a low-interest bank loan.

Minimum Requirements

Because of the heavy increase in air conditioning and other electrical appliances in the home, we are recommending in Dallas that no home have less than a No. 2 service entrance and a rating of service equipment not less than 100 amp.

This complies with the new standards recently adopted by an industry committee and published in the *Handbook of Residential Wiring Design.*

Air conditioning has been responsible in large part for the increase in our personnel assigned to home wiring work. Six years ago we had only one person working part time to give residential customers help with their wiring plans. Today we have three full-time field men and a supervisor.

Finally, air conditioning has brought the company and the customer into closer contact, a very important part of good customer relations. We have been able to give him *personalized* service. In many cases we have advised him on the type of air conditioning he requires, worked with him on an estimated cost of operation, and then followed through to see that our electric service was supplying the capacity needed for his operation. All of this helps to create friends for the company, good customers who have confidence in their electric service and the feeling that they are getting their money's worth.

As a summation, air conditioning, already a big business, is setting off a revolution in the living habits of the American people. While it is already big, air conditioning is going to get bigger and spread into areas not thought of before as "hot areas." Generally, the development of air conditioning may be expected to follow the pattern of growth established in the Southwest, although to perhaps a lesser degree in some areas.

Your problems and your opportunities as electric utility companies faced with growing air conditioning loads will be similar to ours in the Southwest.

How to Meet the Challenge

Air conditioning will continue to be an opportunity for the electric utility industry. And we can best meet this challenge by:

Providing economical, adequate service to the air conditioning customer.

Making a realistic reappraisal of rate structures.

Encouraging the use of off-peak services in order to balance winter and summer loads.

And being prepared, through a careful study of our system areas, to serve the coming air conditioning load.

The late Dr. Willis H. Carrier, a pioneer in the air conditioning field, said back in 1941: "The time is almost here when men will no more let themselves and their families suffer from heat and humidity than they now permit them to suffer from cold and storm."

We can say, I believe, that that time has now arrived.

Inter-Dependence of Free Enterprise

By H. C. McClellan

President, Old Colony Paint & Chemical Company, and
Chairman, National Association of Manufacturers

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 14, 1955

I SUPPOSE my exposure last year, as President of the National Association of Manufacturers, to groups representing many industries explains my subject, "Inter-Dependence of Free Enterprise." In this case "inter-dependence" means the joint or common effect which the advance or threat of socialism can have upon every industry and upon our cherished American institutions. Surely this is a subject which NAM has been interested in for many years. Since our founding—60 years ago in 1895—we have realized that industry must work together to protect our traditional freedoms.

May I at once register my profound admiration for you people. The electric light and power industry has been in the trenches, on the firing line, manning the guns, taking the brunt of the attack—yes, holding the fort—in a historic battle against socialism. Your stamina is positively of epic proportion. On behalf of others who can't know the half of it, I say, "Thank you!"

Example of Philosophy of Freedom

From its beginning in the last quarter of the nineteenth century, the electric light and power industry has been a living example of the American philosophy of freedom, freedom which permits the exercise of personal abilities and ingenuity consistent with the rights of others. This unquestioned tradition made possible the formation of the first company to be concerned with electric power supply as we know it today. It was organized solely on the basis of faith in one man's ability.

Thomas A. Edison foresaw the elements of an electric light and power system, but did not have enough money to develop it as he would have liked. The money put up by investors in the Edison Electric Light Co. enabled him to continue his work. Despite skepticism and ridicule from many quarters, he justified the stock-

H. C. McClellan

holders' trust in him and gave the world the electrical age.

It is ironic that in the field of Edison's first and perhaps greatest triumph, electric light and power, the forces of socialism have made their greatest penetration—ironical, but, in a sense, understandable.

Generating and marketing a product that is a public utility, private companies early in the industry's history suffered inroads by municipalities, eager to take over. Yet, in the true sense, electrical development traditionally has been free private enterprise. Never did public ownership represent more than six per cent of generated power until the early 30's —the depression 30's.

What made possible these governmental gains of ownership and operation, competitive to private enterprise? Were they isolated—confined to your industry alone? Could they have been prevented or, at least, better held in check? To what extent do they represent victory for the forces of socialism and nationalization?

TVA — the Federal government's first great invasion — was a "depression baby." It was originally a "make-job" project. It was supposed mainly to have to do with the development of navigation and flood control. Its alteration into a power project was "put across" on the taxpayers. Recently a newspaper reporter recalled that the birth pangs of TVA brought forth from Mr. Lilienthal sharp words about the "great power monopolists" who were, and I quote Mr. Lilienthal, "trying to block a flood control and irrigation project just because it had some power plants as a by-product." (*Wall Street Journal*, April 6, 1955: "Poor Little Behemoth.")

Growth of Government Control

In those days the so-called power giants were handy targets. Backers of TVA took pains to explain that they were opposed to monopoly and bigness; that the TVA power plants were being built simply to provide a "yardstick"—and to make their yardstick work they had to eliminate a private utility system. I sometimes wonder whether a better fight might not have been made to halt the building of the incarnate public monopoly that TVA was and is. Couldn't we have fought harder against this undermining of our private utilities? I mean, couldn't a better battle have been waged if industry as a whole had rallied around the beleaguered electric light and power industry?

I seem to remember pleas for help. I seem to recall that your industry based its pleas on the interrelationship of private enterprise. "Can't you see," the electric industry said, "that if the government takes over power, it will be able to do the same in other industries?" Though the pleas did not fall upon deaf ears, they brought few fresh recruits. Why? Because other industries were having troubles of their own — government troubles. Washington was moving in on them on a dozen fronts.

And how those fronts have expanded. Today Uncle Sam is the largest landowner—the largest insurer and the largest lender—the largest land-

lord and the largest tenant—the largest warehouse operator, the largest shipowner, the largest truckfleet operator, and the largest manufacturer and user of red tape in the world.

I can speak from close personal experience of the government's venture in the paint industry. Paint is a large and vital business in which I have a small interest. Like you people in the electrical field, paint has its national organization — the National Paint, Varnish and Lacquer Association. Well, in its long, lone fight to get the government out of the paint making business, the paint industry recently won a victory!

And long and lone, the fight was, too!

The record shows that way back in 1932 the association urged the Shannon Committee of the House to recommend that the Navy stop manufacturing paint. Though the industry's efforts were unceasing, there was no policing or checking of government paint manufacturing until the Harding Subcommittee hearings in 1952. The industry knew all too well that the Navy was a competitor, but it then learned how big a competitor. The Navy was producing 150 paint items.

Eliminating Federal Competition

As you know, when the Eisenhower Administration took office it launched efforts to eliminate Federal enterprises palpably competing with private business. It also set out to appraise the extent and justification of government enterprises of this character. Directives were issued by departments; bills were introduced in Congress.

Thus prompted, the Navy in May, 1953, reduced its manufacture of paint items from 150 to 28 items. After long hearings at which the association could present the effect of past and continued competition on the industry, the House Operations Committee recommended the Navy eliminate all paint production.

Last year, in connection with the pending legislation the association testified at both House and Senate hearings, and furnished information to both Committees and their staffs. As a result, legislation to eliminate all government competition passed the House. But it failed in the Senate in a last minute scramble.

However, the paint association continued to work closely with the Bureau of the Budget, the Hoover Commission, the Department of Defense and the Business and Defense Services Administration of the Department of Commerce. And I can report that these agencies seem determined to carry out the President's announced policy of ending government competition with business wherever possible. The Department of Commerce, which was very helpful during the negotiations, recommended to the Defense Department that the Navy discontinue manufacturing all paints.

Victory for Paint Business

So it came about that in February the Navy ordered the manufacture of all exterior ship paints discontinued by August 1, 1955. The department retained the right to produce all types of ship bottom paints. But after more conferences with the Navy, Defense, and Commerce Departments, the Navy on April 14 agreed to stop producing ship bottom paint, too—we hope by August 1. So we look forward to that date as V-P Day. It was a long hard fight, mom, but we won it.

I hope you'll excuse me for dwelling so long on my favorite industry. But I think it illustrates the difficulty of the problem when one industry stands alone in the fight to get government out of business. It was a 30-year struggle. Besides, it's a story with a happy ending. And a happy ending is all-important for the American people.

More Progress

Still better, the paint industry's victory is not the only one. There have been others.

As you know Secretary of Defense Wilson has made progress in taking defense agencies out of private business.

Under the leadership of Secretary of Commerce Weeks the Federal government was able to dispose of government-owned barge lines. Incidentally, the Federal Barge Lines after more than 30 years of government operation, had such a dismal annual balance sheet that the Secretary's ability to find a private buyer was considered a stroke of genius. But that was only the beginning of the miracle. The very first year of private operation found the lines out of the red for the first time, and they have been flourishing ever since.

And, more recently—only a month or so ago—24 of the 27 government-owned synthetic rubber plants were sold to private concerns for $310 million. They were sold on the recommendation of the Rubber Disposal Administration created by Congress. In both branches of Congress Republicans and Democrats alike supported the move to get the government out of the synthetic rubber business.

Meanwhile Senator McClellan, chairman of the Senate Government Operations Committee, has introduced a bill stating a new policy in the field of government competition with private enterprise. And it's reported to be receiving encouraging support.

Industry supports the McClellan bill, but labor unions and government employee organizations generally oppose it.

TVA Branching Out

While Mr. Eisenhower succeeded in getting the Federal government out of some fields of private business, the Tennessee Valley Authority is branching out. Its latest activity is the production of diammonium phosphate in competition with the fertilizer industry.

It is gratifying to see that among the Hoover Commission's recommendations last month was one that TVA end all chemical research. It recommended that its fertilizer research be transferred to the Department of Agriculture and that the price of TVA-produced fertilizer should be raised to cover "all costs" including the loss of taxes that could be obtained from private industry.

But the government, through TVA, now is in the power-generating business, the power distribution business, the fertilizer business, the transportation business, the construction business, the housing business. And some of these enterprises are hundreds of miles removed from TVA damsites, or—as C. M. White of Republic Steel has said, "a damn sight removed from the original authority whereby the government first started its flood control projects on the Tennessee River."

If a business corporation engaged in activities beyond its charter, its

officers and directors would go to jail.

To my mind, two factors are responsible for the inroads of government on business. One, the timing of socialistic schemes amidst the depression. Two, the failure of the American people to recognize that a rampant form of socialism was being introduced. For the latter we have ourselves partly to blame. We somehow failed to give the people the other side of the story. Shall I say that back in the early days of TVA we watched our fellow citizens being taken in with a sort of helpless fascination? Every day we saw in the papers how advocates of government ownership put it across, creating a popular opinion favorable to TVA. The Federal government only wanted to set up *just one* "pilot plant." It only wanted to prove how cheaply electricity could be produced when it was taken away from those "bloated capitalists," who had been "growing fat" on the savings of "the little people," and turned over to a "benevolent government." This pilot-plant dodge came to be referred to as the "yardstick." They called TVA the yardstick for electric power. *Really, TVA was the yardstick for socialism.*

Inescapable Inter-Relationship

The advance of socialism points up the importance of the inter-relationship of private enterprise. One industry's self-interest—which is to say its interest in its own survival and prosperity, its interest in providing jobs, in selling its products at low prices—is wrapped up in other basic industries. The inter-relationship is inescapable.

How much better a job could be done if all industry joined forces to fight government competition! Past experience should prove the need for future cooperation. All business should be forthright in opposing government's invasion of free enterprise. But it is also important to voice approval when constructive action is taken. How many of us applauded government action in the Federal Barge Lines case? How many of us have expressed an opinion on the red-hot Dixon-Yates controversy? How many of us have encouraged the administration in its program to turn the electric power business back to private hands?

In order to win, we must support the administration when it moves in the right direction with the same vigor that we voice our objections, when it moves in the wrong direction.

This must be done by all industries, whether affected or not. NAM can be—and is—industry's spokesman. And it isn't afraid to speak out.

After all, we of NAM are dedicated to the broad purposes and objectives common to all industry. NAM is a common denominator of industry—an agent of inter-dependence. This is the very thing that created NAM in the first place—finding the answer to mutual problems. Today NAM is a voluntary organization of 20,000 companies, 83 per cent with less than 500 employees each. It represents a cross-section of American industry.

While the separate industry organizations, such as your Edison Electric Institute and my Paint, Lacquer and Varnish Association, carry on their limited skirmishes, NAM fights beside many organizations as the broad battlefront of all industry.

Representing all industry, NAM has the benefit of the experience of leaders in every field working on its many committees and establishing policy. And let me pay tribute here to the late Lane Weber. As NAM director from the electric power industry, he saw that your industry's views and causes were truly represented on NAM's board of directors. He dedicated his life to this inter-relationship of industry—the inter-dependence of our free enterprise.

That inter-dependence, and the need for eternal vigilance, could not be more dramatically illustrated than in the field of atomic energy development. Far down the road—and perhaps not so far—light, power and heat will come from atomic energy. Who's going to supply it—the government, private industry or both? What will this mean to your industry?

If the government owns all, as Tom Anderson writes in *Farm and Ranch*, and I quote him, "the combination of that economic and political power will be a gargantuan step toward Fascism or Socialism. Since all industry is dependent on light and power, the bureaucrats could emerge as the complete czars over all industry, rationing out light and power—not competitively—but politically."

NAM early made it clear that it believed the government should retain control of atomic energy, but that a government agency should be set up "empowered to license applicants to develop, manufacture, use of own apparatus or facilities for industrial, commercial, or other non-military uses wherein fissionable material is used or produced." Last year's amendment to the Atomic Energy Act was merely a step when we need a giant's stride in this direction.

Industry, business — any idea — needs air and warm sunlight to grow. It needs more than anything a climate of freedom. Let us get back to the basic principles on which our country was founded. America is a nation of individuals—164 million free individuals. The sooner we start thinking in terms of the free individual—the free worker, the free farmer, the free taxpayer, and the free consumer—the sooner shall we start throwing off this drug of socialism which paralyzes us in every limb.

It is the free individual that counts—the free individual and his self-reliance. Let us draw on the legacy left by the man after whom this Institute was named. Thomas Alva Edison is a towering figure of a man. But he does not stand alone. He stands tall as an illustration of the American story—that free men are best inspired to greatness by the challenge of the work to be done.

Christmas Gift Promotion

THE deadline for ordering display materials of the new Coordinated Electrical Gift Campaign for Christmas gift promotion has been set at Aug. 1, 1955.

Developed by the Residential Promotion Committee working with allied industries, the campaign material is designed to meet the needs of all types of electrical dealers and bears the message "Make Christmas Giving Mean Better Living—Give An Electrical Gift." An Electric Gift Display Kit contains colorful streamers, hang-over wire pennants, two large and two small easel backed cards, small appliance wrap-arounds, and appliance tags with room for price information that can be attached to any electric appliance.

The Christmas Gift Campaign is the final coordinated campaign for 1955. Details for the 1956 Coordinated Campaigns will be announced early next Fall.

Let's Go Into Action

By Elmer L. Lindseth

President, The Cleveland Electric Illuminating Company

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 14, 1955

ACTION (American Council to Improve Our Neighborhoods) and ACTION's objectives are of tremendous importance to the electric utility industry.

Of this proud nation's 50 million homes, only seven million are in first-class condition. The remaining 43 million are in some degree sub-standard. Eight million are actually in slum or near-slum condition.

It is a strange paradox indeed that we Americans, who boast the highest standard of living in the world, should also have so much of the lowest.

Yet our efforts at rehabilitation must not be restricted to the one home in six which is in slum or near-slum condition. Our efforts must be directed at *every* home in the United States. Even the seven million first-class homes must be kept first-class.

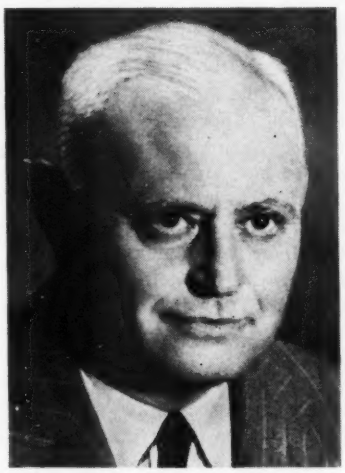
It will be a major job to arouse the American people to a sense of the value and importance of their homes. Pride of ownership among home-owners has been on the decline for decades, and we have accumulated a tremendous backlog of decay and neglect. We are long overdue in organizing our industry and others to reawaken Americans to the wisdom—in fact, the necessity—of proper home maintenance, repair, and modernization.

Sub-Standard Homes

Electrically speaking, the vast majority of America's homes are obsolete. Measured against the living standard which modern appliances make possible, the number of sub-standard homes is truly alarming.

Twenty-two million American homes have ranges over 15 years old. More than 45 million homes lack clothes dryers of any kind. Some 25 million do not have automatic water heaters, either gas or electric. Over 40 million are not just inadequately, but poorly, lighted. Twenty-one million do not even have wiring that would permit the use of these improvements, if the occupants were to buy them.

According to a recent General Electric survey, 42 per cent of all homes



ELMER L. LINDSETH

have only two-wire, 30-amp entrance capacity. Think of it! More than 21 million American homes in 1955 with only two-wire service!

Yet this is only part, although an important part, of the sorry housing picture which our industry must help set right if our business is to remotely approach our market potential.

And let there be no mistake about the great and growing importance of residential usage to utilities. Just 10 short years ago, residential customers accounted for only 15 per cent of all electric energy sold. Last year, that percentage was 26. This is a tremendous increase in just one decade—a greater increase than for any other class of customers. On a revenue basis, sales in 1944 totaled $1.1 billion; in it is even more impressive. Residential 1954, they were $2.9 billion, an increase of 160 per cent.

These figures show what has happened despite our severe bottlenecks of inadequate wiring, the general sub-standard condition of housing, and a nationwide apathy regarding home improvement. The results of the past decade are only a fraction of what we can attain if we really organize to tap the potential I have mentioned for ranges, clothes dryers, water heaters, and improved lighting alone.

To gauge that potential, let's make the conservative assumption that ACTION, in its effort to raise *all* American housing to even modest standards, accomplishes only 10 per cent of that objective.

That 10-per-cent success, combined with good sales promotion on our part, can add to our lines 2 million additional electric ranges, 4½ million additional electric clothes dryers, 2½ million additional electric water heaters, and 4 million additional relighted homes.

For the appliance industry, this adds up to about $2 billion in *increased* potential sales. For the utility industry, it means some $300 million annually in *increased* residential revenues beyond what we can otherwise expect.

Let me repeat: even that is only a small sample, based on the assumption that ACTION achieves a mere 10 per cent of its potential.

We can scarcely imagine the possibilities if we reach 20, 50, or 100 per cent of the goal in the residential field, to say nothing of the collateral commercial and industrial benefits. And with the support of other interested organizations, our efforts should be highly successful. In fact, if this country's homes and neighborhoods are to be saved from decay and degradation, our efforts *must* be highly successful.

Only a Beginning

Electricity contributes more to our modern American living standard than any other single factor. Yet we cannot claim to have made more than a bare beginning with today's contribution, impressive though it is.

Millions of homes today do not enjoy even the barest minimum of electrical living.

In part, this failure is due to the fact that those homes are inadequately wired. I mentioned previously that 42 per cent of American homes, 21 million, have only two-wire service of 30 amp or less. Even more disturbing is the fact that of the homes being built today, and this is largely the fault of the utility industry, 20 per cent have an entrance capacity of 30 amp or less.

In part, too, many homes lack electrical conveniences because our selling campaigns fall on unreceptive ears. The ACTION presentation shows that too many people today are not concerned about their domestic housing standards because their interests have been channeled elsewhere. Smart advertising is persuading them to spend their money on things much less vital to their welfare.

For example, millions of Americans have cheerfully spent $2500 or more on a new car, while their homes lack an adequate range, a water heater, automatic laundry equipment, or even the barest minimum of adequate lighting. And 4½ million families today own not just one, but two cars. The average income of these families, many of whom would claim they cannot afford a new electric range or dryer, is slightly over $7,000 a year. The automotive industry estimates that by 1960, the number of two-car families will exceed 7½ million.

Need for a Selling Job

Can't our industry do as good a selling job as Detroit? I think we can, if we put our minds and energy to it. Certainly what we have to sell is closer to home, and means more in better living standards, than the automobile, important though that may be.

ACTION has a program that can help us. ACTION offers our industry a unique opportunity to work with other interested industries and with civic and professional organizations in a coordinated, broad-scale campaign. Rehabilitation is their concern. It is also our concern. By pooling our efforts with theirs, we can multiply results.

The task is no easy one. In fact, it's a mammoth job, this reconstruction and renovation of America's homes. The total bill will be at least $40 billion. *Nation's Business* estimates that $15 billion needs to be spent on rewiring alone.

All this is over and above the $12 billion already spent each year on home improvement, modernization, and maintenance. Currently, one-half of that $12 billion is spent by only one-tenth of all householders. Almost half of all home owners spend nothing at all.

This program merits all the strength our industry can muster—moral, organizational, and financial. The results can be worth many times the effort and outlay involved.

We can share in the increased general prosperity that is bound to accompany such broad-scale rehabilitation of America's homes.

We can gain by increased appliance sales and electric usage.

We can enjoy heightened public respect and confidence, because ACTION will indirectly act as a public relations force for the entire electric utility industry.

We can share in the reduction of taxes that will follow wide-scale improvement of America's neighborhoods. Slums represent a heavy drain on tax-supported police and welfare services. And in many municipalities, our companies are the largest single taxpayers.

Finally, we can be citizens of a better, sounder, more self-respecting America.

Specifically, what should we do, you and I?

First and foremost, let's each of us get informed, become literate about the whole vast and complex problem of decayed and decaying neighborhoods.

Second, let's publicly endorse ACTION and its objectives, both personally, and in the name of the companies we represent.

Third, let's give all possible publicity to the ACTION story. Let's stimulate the interest of our local civic and welfare organizations working in this field. Let's tell them what ACTION can do for our communities.

Fourth, let's motivate our associates and our employees to take leadership in rehabilitation projects in our areas, and to integrate those projects with the nationwide ACTION campaign. We will be well advised here to look closely into the "foundation" idea. A number of cities—Baltimore, Cleveland, Cincinnati, and St. Louis among them—have established development foundations dedicated to improving housing conditions in cooperation with municipal, county, state, and federal authorities. They are showing impressive results.

Fifth, let's give ACTION wholehearted financial support.

If we do these things, we can spearhead the success of ACTION in every community we serve. That effort will be repaid many times over, not only in dollars and cents, but in the far richer rewards of a better America. We can help to reduce the toll of crime, disease, delinquency, heartbreak, futility, and broken homes; we can strengthen the very moral fibre of the nation.

These will be the collateral benefits to our normal business gains; they will be ours "for free."

Utility Problems in the Pacific Northwest

(*Continued from page* 226)

do what it once made a great show of doing; the opening of a door called the partnership policy to new opportunity; and the belief held by private utilities that, if permitted, they are willing and fully capable of doing this important job.

Future Expectations

I have wanted also to tell you that we can expect the political power bloc to increase their propaganda, and to hurry their drive to socialize the electric industry. In other lands, as Kenneth Sollitt has pointed out, socialism has demonstrated four important facts over and over again. You can't multiply wealth by dividing it. It does no good to get rid of a few little monopolies by creating a big one called government. The government can't give away what it does not first take away. And it can never take away enough to supply the ever increasing demands of those who are led to believe they are getting something for nothing when they get it from Uncle Sam.

Truths Not Yet Learned

Evidently, people in America have not yet learned these truths—not yet. And we have a responsibility to inform them. And as to the difficulties we may encounter along the way, I am quite sure they are not new to any of us. We are accustomed to them. We accept them as a challenge. It is true that to the individual company these difficulties may seem mountain high. But standing together, thinking alike, speaking without fear, working together, the future is a challenge we accept with confidence.

The Shippingport Atomic Power Plant

By Philip A. Fleger

Chairman of the Board, Duquesne Light Company

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 15, 1955

ON September 6, 1954, President Eisenhower passed a baton containing neutrons over a block of uranium in Denver, Colorado. With the speed of light a fissionable reaction swept 1200 miles over the prairies to a picturesque site on the Ohio River near Pittsburgh, Pa. There, in the presence of Congressman Sterling Cole, co-author of the Atomic Energy Act of 1954, Admiral Lewis L. Strauss, chairman of the Atomic Energy Commission, and some 1,400 persons, a giant tractor, with no operator at the controls, responded to the President's remote impulse. The tractor moved forward, scooped up a shovelful of earth, and the spectators, sensing the far-reaching significance of the occasion, rose and let out a tremendous cheer.

The End of the Beginning

Thus, ground was broken for America's first full-scale nuclear power plant. Thus, on the outskirts of a tiny town called Shippingport, near the site of Fort Duquesne, an outpost of freedom for the early pioneers, was launched a great venture, a venture which may be destined to mark an historic turning point in the history of the electric power industry, of our country, and, indeed, of the world.

Congressman Cole said: "Now we are at the end of the beginning. Now we translate our hopes and dreams of using the atom for the pursuits of peace into the concrete and steel of a plant producing large amounts of electricity."

Chairman Strauss described the project as "more fundamentally a pioneer venture than the first railroad to penetrate the west or the first airline to span the continent."

"This ground-breaking," he said, "will surely project its effects into the remotest future for, as we turn the sod for this great new enterprise of the peaceable atom, we are also breaking ground in the area of international friendship and cooperation."

The story of Shippingport is your story as well as ours. In a sense this

PHILIP A. FLEGER

first full-scale atomic power plant is your property as well as ours. Although the plant will be jointly owned by the government and the Duquesne Light Co., you are to own with us the knowledge that is gained from it. You are to share with us in the dividends of the answers to the problems to be solved.

Full-Scale Operation

Shippingport is the result of an important decision, namely, that the development of nuclear power should be advanced from the laboratory stage to that of full-scale construction and operation.

Some competent scientists and engineers believed that a full-scale nuclear power plant should be built only after it was more nearly certain the power it produced would be competitive with power produced from conventional fuels. But, as Thomas E. Murray, speaking for the Atomic Energy Commission, said when he announced the decision to construct this country's first full-scale nuclear plant, "Such a course meant more paper studies and more delays." He added, "We were persuaded that we had much to learn that could only be learned by building and by operating."

The reactor in the Shippingport plant will be of the pressurized water type. When construction of the plant was first proposed, there was a natural and desirable difference of opinion as to the relative merits of this type of reactor and certain other types, principally the sodium graphite, boiling water, homogeneous, and fast breeder reactors. The selection of the pressurized water reactor for the first full-scale plant was largely governed by two factors: first, it was the only type of reactor then ready for full-scale construction; and, second, it was the consensus of opinion that the development of all types of reactors would benefit from the information and experience that would be gained in the construction and operation of any full-scale plant, including the pressurized water reactor. These considerations were emphasized in the initial report of the Joint Committee on Atomic Energy on the Five Year Reactor Development Program proposed by the Atomic Energy Commission in February of 1954.

Hence, the Shippingport plant is not being built solely for the purpose of developing the pressurized water reactor; rather, it is being constructed for the purpose of advancing nuclear power technology generally. Accordingly, the entire plant is being built along very flexible lines. The reactor portion will accommodate additional cores of different types and larger size. Multiple components are being made by a number of manufacturers using different designs. And materials of various kinds are being utilized.

Justified Investment

Of course, such flexibility will substantially increase the cost of Shippingport. But the larger investment is fully justified by the additional knowledge that will be gained. Knowledge, after all, is our immediate objective, for we have much to learn before we will know how to build nuclear power plants that are competitive with conventional plants.

From time to time estimates of the cost of power at Shippingport have been mentioned in newspaper and

magazine articles and in radio and television programs. None of these estimates are authoritative and there is no firm basis for them. On the contrary, as the Atomic Energy Commission pointed out when it first announced the project, one of the primary purposes of building the Shippingport plant is to provide a firm basis for estimating costs.

In developmental plants such as Shippingport, construction costs will reflect the cost of many things which have been embodied in the plant for research and development. The relatively high cost of components manufactured on a tailor-made or non-tooled basis will also be a distorting factor. True construction cost values will be further obscured by subsidies from firms desiring to be associated with the projects for the purpose of gaining knowledge and prestige. Initial operating expenses will be inflated by manpower costs which will reflect lack of experience, insufficient knowledge of safety requirements, and test work. And, of course, initial operating expenses will also include charges for depreciation based on estimated lives which may or may not prove to be realistic in the light of experience.

Cost of No Significance

Therefore, the actual cost of electricity produced by developmental plants such as Shippingport will be of no significance whatsoever. On the other hand, with the knowledge gained from the construction and operation of these plants it will be possible to estimate the cost of constructing and operating plants of the same type on a non-developmental basis and, from this, the cost at which such plants can produce electricity. These estimates will present some difficult questions, especially as to the life of various elements in the reactor portion of the plant and the proper amount to set aside each year for their depreciation. But reasonable accuracy should be attainable after several years' operating experience. Any estimates made prior to this will have to be based upon many arbitrary assumptions and will be in the nature of guesswork.

The beginning of test operations at Shippingport was originally scheduled for mid-1957. That is still the target date, but manifestly for such a revolutionary plant the schedule is a tight one. Excavation has been completed and large-scale construction is about to get underway.

The nuclear part of the plant is being designed and constructed by the Westinghouse Electric Corp. under contract with the Atomic Energy Commission. Duquesne Light is building the turbine-generator portion and will operate the entire plant as an integral part of its system.

In the reactor a light water coolant, under pressure, will serve both to slow down the high energy neutrons and to remove the heat generated in the reactor core. The coolant will then pass to heat exchangers, where the heat will be transferred to boiling water with the generation of steam. The steam subsequently will pass to a condensing turbine and then be returned through a regenerative cycle to the heat exchanger boilers.

The reactor is expected to be inherently stable, which means that a rising temperature will reduce the reactivity and tend to reduce the heat output. However, the reactor will be provided with control rods which will be required for certain purposes. The reactor and boilers will be enclosed in large cylindrical steel containers to prevent the escape of radioactive material in the remote case of coolant system failure.

The average temperature of the primary plant water will be maintained at about 525 degrees. The steam pressure at the turbine at full load will be about 600 lb. without superheat.

The entire plant, including the reactor, is being designed to meet the inherent requirements of the Duquesne Light Co.'s system as to rates of load pickup and rejection. The over-all control of the plant will feature ease and simplicity as necessities for safety and dependability. A single control room is planned in which the operation of the reactor, the turbine-generator, and the electrical equipment will be concentrated.

Electrical Output

The reactor will produce at least 60,000 kw net electrical output. The turbine-generator will have a maximum capability of 100,000 kw.

At this early stage it is not possible to foresee all of the information that will be gained from the construction and operation of the Shippingport plant. Even the matters on which we now know that valuable knowledge will be developed are too numerous to mention; it is feasible to give only a few examples.

With respect to the development of the pressurized water type of reactor, the Shippingport plant will provide valuable information on pumps, primary circuit piping, heat exchangers, and other things peculiar to that type of reactor.

But this first full-scale plant will also supply much information of importance for almost any type of reactor capable of producing heat for the generation of steam for electric power.

Heterogeneous Reactors

As to heterogeneous reactors, that is, reactors with a core composed of different materials separated one from the other, Shippingport will help to determine the design, methods of fabrication, life and cost of fuel elements. Of great importance will be the experience to be gained with respect to the ability of different fuel elements to withstand long periods of irradiation and use. Also we shall learn about the effect of fuel element failures on the problems of maintenance and replacement of parts of the system other than the core.

For both heterogeneous reactors and homogeneous reactors, meaning by the latter, reactors with a core composed of a uniform material such as a solution or slurry, the Shippingport plant will provide a fund of information. To mention just a few things, information will be obtained on radiation levels, and maintenance of radioactive equipment. Knowledge will be gained concerning the control problem, which embraces not only the need for dependable instruments but also information on the actual inherent behavior of the reactor. This involves changes in core reactivity, both short-time and as affected by aging, which must be coordinated with the load changes arising in the particular system of which the plant is a part. Operating experience will develop practices for dependable service and for safety, which may eventually permit the elimination of such costly special construction. Although proper design and well-planned operation should minimize unexpected outages, valuable information will be gained from experience with emergency problems, such as scram, loss of auxiliary power, loss of coolant flow, and other mechanical and electrical failures. Operation of the Shippingport plant will also aid in determining the manpower requirements of nuclear power plants. This

is especially important since a serious problem lies in the shortage of well-trained, experienced, scientific and engineering personnel. A preliminary manpower schedule for Shippingport has been established and training of the personnel will be started very soon, or about two years before initial test operatons are to begin.

Educational Program

Consistent with the developmental character of the Shippingport project, the Atomic Energy Commission is sponsoring a comprehensive educational program in conjunction with the design, construction, and operation of the plant. The program will include periodic information meetings, plant tours, and progress reports. To facilitate this program the Commission is declassifying information concerning the project as rapidly as security requirements will permit.

Thus, Shippingport will be a university, so to speak, for the electric power industry of this country, for the free nations of the world and, within limitations of national policy, for the countries behind the Iron Curtain as well.

At the ground-breaking, Chairman Strauss declared: "Men of many friendly nations in the days to come will be welcomed to this place where we are now standing—to study, to observe, and to carry home with them the benefits of our technology, devoted solely to the arts of peace."

Basic Philosophy of Program

In outlining the basic philosophy of its civilian reactor program, the Atomic Energy Commission recently said that "The Commission's role should be to develop advanced technology at government expense and to stimulate outside groups to undertake developmental or demonstration power projects primarily with non-commission financing." The Commission also said that "developing economically competitive nuclear power for civilian use will be aided by maximum practical utilization of the financial incentive common to business ventures."

Technology Advanced

The Shippingport project is a concrete expression of this philosophy. It will develop advanced technology at government expense. It has already served to stimulate other groups to undertake development or demonstration power projects; in fact, one might say that the initiation of the Shippingport project "broke the ice" as far as construction of full-scale plants is concerned. As to the utilization of financial incentive common to business ventures, Shippingport is a natural and logical step in an orderly transition from the complete government monopoly produced by the military requirements of the Second World War to the development of the atom for industrial purposes by private business under the regulatory supervision of the government. The partnership engaged in this transitional project capitalizes on the broad knowledge gained by the government in the development of atomic weapons, as well as the government's extensive resources; it takes advantage of the experience of one of the foremost industrial organizations in the nuclear power reactor field; and it recognizes that, since nuclear power reactors must be so constructed that they will be able to meet the inherent requirements of the particular electric utility system which they serve, the knowledge and experience of an electric utility operating company is essential, too, in designing and building reactors.

A Challenge and an Opportunity

With the dropping of the atomic bomb on Hiroshima and Nagasaki, the scientists opened up a Pandora's Box of the energy that lights the stars. As a result, we of the electric utility industry are presented with a tremendous challenge and, at the same time, with a tremendous opportunity.

In the quest to make this new fuel competitive with fossil fuels, and thereby to take advantage of this inexhaustible supply of new energy, we not only have a duty to do our part, entailing the risk of capital as it will, but as a means of self-protection we must do our part. Only last month the Atomic Energy Commission said, "The early development of economically competitive nuclear power by the United States is an important national objective." The Commission went on to say that, "Achieving economically competitive nuclear power in an accelerated time schedule is believed to be desirable, if not essential, for both domestic and international reasons."

In other words, the government is committed to developing nuclear power as rapidly as possible, and if private industry does not undertake this development the government is prepared to do so. This, of course, could sound the death knell of the investor-owner electric utility industry. But there is no doubt that our industry is alert to its responsibility, to its challenge, and its opportunity.

Industry Advances Impressive

In our generation we have seen commercial aviation develop to the point where men of action cross the continent in eight hours, cross the Atlantic in slightly more time; where they board planes for the Orient with the facility with which one takes a bus to go to and from downtown. We sit in our homes and listen to radio broadcasts from Tokyo, London, Berlin and Rome; we view TV spectacles in distance places.

Yet the advance of the electric power industry since that first day at the Pearl Street plant in 1882 has been equally impressive. It has relieved the drudgery of millions of housewives. It has straightened the backs of countless farmers and industrial workers, and it has increased their productivity many, many times.

Electric Industry Abreast

In spite of periodical material shortages, our industry has kept abreast of the nation's increasing thirst for power as the years have rolled by. It has played an indispensable part in making this country the most powerful in the world. Very definitely it has stamped its imprint on America's profile. There is not the slightest doubt it will make its due contribution to the atomic age. The Shippingport atomic power plant is a part, a necessary part, of that contribution.

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Industry's Response to Nuclear Power

By Edgar H. Dixon

President, Middle South Utilities, Inc., and
Chairman, EEI Committee on Atomic Energy

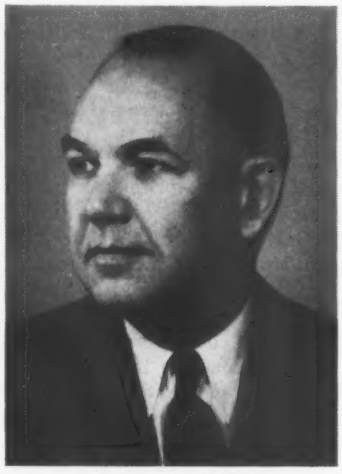
An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 15, 1955

THE subject of atomic energy in general and nuclear power in particular is one which has captured the imagination of the American people. Hardly a day goes by that one cannot find in his daily newspaper an article concerning some new atomic development. It may be the discovery of some new use of the atom or it may be the declaration of yet another company's intention to enter the atomic field. It may be an announcement that an electric utility company is planning to construct a power reactor or join in such a project. These activities are a matter of cause and effect. The cause is last year's modification of the 1946 Atomic Energy Act to encourage industrial participation. The effect is the wholehearted effort of American industry to respond to that encouragement.

So much has been happening in this field in the past few months that I think it may well be time for us to stop for a few moments' appraisal of what industry has done in response to the challenge of developing nuclear power. We might also ask ourselves what industry can reasonably be expected to do in the future. I have found that one who attempts to stop for a few moments to reflect on the current status of developments in nuclear power does so at his own peril. By the time he has fixed the situation in his own mind and thinks he knows what's what, some new development has taken place and his carefully arrived at "status" is past history.

Early Participation

Although some farsighted individuals and companies began to think of peaceful industrial uses of atomic energy during the 1940's, I believe it is accurate to state that industry began to get seriously interested in 1950. During that year the AEC received several inquiries looking toward the design and construction of



EDGAR H. DIXON

nuclear reactors with private capital and their operation and use by industry. By July, 1951, agreements with the AEC had been signed by four study groups — Union Electric Co. of Missouri and Monsanto Chemical Co.; The Detroit Edison Co. and Dow Chemical Co.; Commonwealth Edison Co. and Public Service Co. of Northern Illinois; and Pacific Gas and Electric Co. and Bechtel Corp. These studies, which were aimed at enabling the groups to evaluate the possibility of industry's using its funds to design, build, and operate large reactors, were financed entirely by the companies concerned except for those costs incurred by AEC in supplying information and consulting services.

Subsequent Developments

As time went on, many more companies became interested in studying the possibility of developing the peaceful atom. The latest figures published indicated that no less than 71 organizations were participating in study agreements with the AEC. Included were 45 utilities, ten equipment manufacturers, nine engineering and construction firms, five chemical companies, and two shipbuilding companies.

AEC estimated that through December 31, 1954, the study groups had spent more than $8 million, some 20 times as much as AEC itself had spent on this phase of the program. Since these figures were published the AEC has made it much easier for companies to enter into this "study" phase of its program. I shall have more to say about this later.

One of the finest showings industry has made in this field was the response to AEC's 1953 invitation to participate in the design, engineering, construction, and operation of the pressurized water reactor. Nine firm bids were received in response to this invitation. It has been estimated that Duquesne Light Co. will expend about $30 million during the period of construction and initial five years of operation.

Last year, 18 bidders responded to AEC's invitation to design, build, and "test-operate" the prototype of the Army Power Package Reactor. The bid of some $2 million by American Locomotive Co. won the competition and a lump-sum contract was awarded to that company. This was the first lump-sum contract the government had ever awarded for such a purpose and was also the first such contract awarded on the basis of competitive bidding. I think it is significant that 18 private concerns were prepared to make serious bids on this basis.

Results of Passage of Atomic Energy Act of 1954

I am sure you will all recall that before the Atomic Energy Act was modified last summer, the strong objections of a small but vocal group had to be overcome. This group insisted that atomic energy was properly a Federal monopoly and that its peaceful development should be carried out only by the government. By and large the members of this group

are those who also would like to see a Federal monopoly of the entire electric power industry. Fortunately, however, in spite of these protestations, the atomic doors were opened to private industry and, because they were, some rather startling things have happened.

On February 10, 1955, an important milestone was reached. H. R. Searing, President of Consolidated Edison Co. of New York, told the Joint Congressional Committee on Atomic Energy that his company would apply to AEC before April 1 for a license to build and operate a private power reactor facility near New York City. This application was submitted and the company is moving ahead with its plans for construction of the reactor. I think the manner in which Consolidated Edison approached this matter deserves the highest praise.

Having made a decision that it was feasible to utilize a nuclear power plant in its system, the company then proceeded on two basic principles. The first was to regard a nuclear reactor as it would other power plant equipment—as available from manufacturers and designed to meet system requirements and company specifications. The second was that the plant would be financed by the company without government assistance. This principle involved tacit acceptance of whatever charges and prices the AEC might establish for nuclear fuels and related materials used or produced in the reactor.

Con Ed Contract

With these principles in mind the company asked manufacturers to submit proposals and retained Vitro Corp. of America as a consultant to appraise the proposals. As a result of this, Con Ed awarded a lump-sum contract to Babcock and Wilcox, the company whose proposal appeared most attractive, for construction of the reactor and steam generators. The plant, scheduled to be completed in about five years, is to have an electrical capacity of 235,000 kw and will cost $55 million. The reactor is to be a pressurized water thorium-uranium converter. The cost of power from the plant is expected to approximate the average cost of power in the Con Ed system.

Perhaps the attitude of Con Ed is best summed up by the words of Mr. Searing himself: "We have no illusions that the reactor we are now considering will be the last word on reactor development. On the other hand, we think it will make a real contribution to the advancement of the art. We want to get on with the job, and as far as possible we want to do it in the same way we normally carry on our business."

Chicago Reactor

Other companies have followed up in the same vein. The Nuclear Power Group, consisting of Commonwealth Edison Co., American Gas and Electric Service Corp., Bechtel Corp., Pacific Gas and Electric Co., and Union Electric Co. of Missouri, proposed to AEC that it be permitted to construct and operate, entirely with private funds, a 180,000-kw boiling water reactor near Chicago. Two additional companies, Central Illinois Light Co. and Illinois Power Co., have since joined in this proposal. General Electric has contracted with the group to build the plant for $45 million with completion scheduled for 1960.

Under the financing arrangements among the participating companies, about one-third of the project cost will be shared by all the participants as research and development expense. The remainder will be borne by Commonwealth as installation cost. On this basis, the cost of the power produced is estimated to be approximately competitive with that from modern coal-fired generating units in Commonwealth Edison's service area.

Detroit Reactor

The Detroit Edison Co. and nine associated utilities have made a proposal to AEC to build a 100,000-kw fast breeder reactor in the Detroit area. The estimated cost of the facility is $54 million, $45 million of which is for the reactor. This cost will be borne entirely by the sponsoring companies except for a small amount of assistance from the government for research work of interest to the entire program. Completion is scheduled for late 1958.

The Yankee Atomic Electric Co., a company formed by New England electric utilities supplying 90 per cent of the electric requirements of the six New England states, has proposed to the AEC the building of a light water moderated and cooled reactor plant of 100,000-kw capacity in western Massachusetts. Monsanto Chemical Co. is working with the utility group in planning and designing the installation. The cost of this plant is estimated at $20-$25 million, which will be financed by the companies involved except for those research and development costs of an extraordinary nature. Completion is scheduled for 1958.

Consumers Public Power District of Nebraska has made a proposal to AEC requesting permission to build a 75,000-kw sodium graphite reactor for completion in 1959. North American Aviation, Inc., is the leading proponent in developing this type of reactor. The cost of the Consumers plant has been estimated at about $24 million.

Role of Equipment Manufacturers

The major equipment manufacturers are playing a most significant role in private development of nuclear power. The activities of some of them—General Electric, Babcock and Wilcox, and North American Aviation—have already been mentioned. Westinghouse has played a full part in the field, as witnessed by the fact that they are building the first full scale plant for AEC and Duquesne Light. Others such as Foster Wheeler Co. and Combustion Engineering Co. are very active in this effort to achieve competitive nuclear power. All of these companies have established sizable staffs of engineers and scientists who are employed full-time on solving the problems that still lie before us. Many of them—and let me assure you that the companies I have named by no means constitute a complete list—have built or are building large facilities at a cost of millions of private dollars to build reactors or reactor components for us to use in utility plants.

Referenced against this tremendous effort is the realization that it may be many years before there are any profits in this business, not only from the standpoint of the utilities, but from the standpoint of the equipment manufacturers themselves. There are many development dollars still to be spent and the equipment manufacturers will continue to pick

up the check for many of them. So will the utilities, the engineering firms, the chemical companies, and other components of industry interested in this field.

It is my understanding that several of the equipment manufacturers are now prepared to discuss with utilities firm contract prices for building various types of reactors throughout the country.

Hurriedly adding up the estimates of the proposals made since February of this year by private companies, I find that they total nearly $180 million. If we were to add the past and planned future expenditures of the equipment manufacturers, of other industry in the field, and of the many utilities whose planning has not yet reached the proposal stage, we would end up with a very large total indeed. Please remember that it has still been less than ten months since the new law permitted this private participation and that even to this day we do not know all the rules under which the game will have to be played.

Outstanding Response

What, then, has been the response of industry to the AEC's industrial participation program? I think the answer is summed up accurately in just one word—outstanding! Lewis L. Strauss, Chairman of the AEC, has had the following to say on this score: "The fact that the proposals have been made is notable. But the significant point is the extent to which the proposers are prepared to risk their own capital. This willingness to assume risks is evidence of the vigor of competitive enterprise. It is also another indication of this nation's faith in the peaceful future of the atom." I couldn't agree with Mr. Strauss more wholeheartedly.

I think, however, that it would be a most serious error for us to assume that the job is complete and that we can now rest on our oars. I believe that our job has only begun and that we must continue to demonstrate to the people of this country that our traditional private enterprise system is still the best and most effective way to get this job done. Reliable surveys indicate that many people still feel that the government alone should develop nuclear power.

We may expect continuing all-out efforts of the federalizers to return the atom to the province of the government. Their efforts are unrelenting, and they are ever critical of private endeavors. In one breath they criticize industry for its "reluctance" to accept the challenge of private development. In the next breath they criticize those companies who have made proposals because they don't feel the companies have studied the problems thoroughly enough.

It might be appropriate at this point to quote from a speech delivered by a public official at the recent convention of the American Public Power Association. The speaker made the following observation:

> "The Consolidated Edison Co. of New York has applied for a 40-year license to construct and operate a 250,000-kw atomic power plant. While I heartily favor investment of private funds in atomic enterprise, I wonder whether the reactor art has been sufficiently developed to justify a 40-year license. More than likely, if this project is approved, the electricity customers of Consolidated Edison will find their rates increased to finance the atomic experiment."

A few paragraphs later he had this to say:

> "Also the Tennessee Valley Authority and the Consumers Public Power District of Nebraska are engaged in atomic power studies. The latter recently proposed, under AEC license, to build and operate a 75,000-kw atomic power plant in Nebraska. Congratulations to the Consumers Public Power District for its initiative and enterprise!"

In other words, while the proposal of Con Ed is viewed circumspectly, the proposal of Consumers Public Power District deserves an accolade. You may draw your own conclusions as to what sort of philosophy this represents.

Foreign Developments

For many reasons we would like to be the first country to achieve competitive nuclear power. How does our progress compare with that of other countries? It seems to me that we are in a fairly satisfactory position and that our position will become relatively stronger as the effort of private industry gains momentum. Great Britain, Canada, and, if we can take their word for it, Russia, appear to be our principal competitors.

Great Britain is apparently making a determined effort to become the world's nuclear power leader, as evidenced by their recently announced $840 million, ten-year, 16-reactor program. A power cost of 7 mills/kwhr for the first of these stations is estimated. Construction of two British experimental power reactor types, started under a previous program, has been underway for some time. Britain, of course, has a greater incentive than we do because conventional fuel costs are much higher there than here. Further, they have elected to devote much of their reactor effort to power while this country, in the past, occupied itself primarily with production reactors for military purposes. My confidence in our private enterprise system is so strong that I believe we can overcome Britain's apparent head start.

Other Foreign Development

Canada has for some years been doing research and development work on heavy water reactors and has announced plans for a 20,000-kw power reactor of this type to be in operation in 1958. They also have plans for a large 100,000-kw heavy water reactor.

France, Italy, Spain, Belgium, Holland, Switzerland, West Germany, Sweden, Norway, Turkey, Brazil, Colombia, South Africa, Australia, India, and Japan are vitally interested in reactor programs and some of these countries already have experimental reactors either in operation or under construction. Although their progress has not advanced to the extent of that of the United States, Britain, and Canada, they may be expected to exert a strenuous effort to overtake the leaders.

It is not possible, of course, to evaluate Russian progress. For what it may be worth, they announced that on June 27, 1954, operation of a 5,000-kw nuclear power plant was started. This was claimed by them to be the first use of atomic energy in an industrial power station. The Russians have also announced that

(*Continued on page* 251)

Our Record Will Win Public Support

By Louis V. Sutton

President and General Manager, Carolina Power & Light Company

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 16, 1955

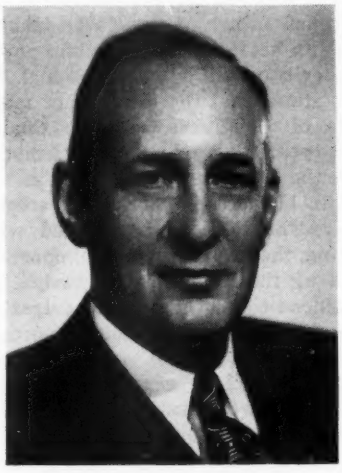
THERE is unmistakable evidence on the part of the American people that they are seeing through some of the political and socialistic attacks on our industry's magnificent record of achievement. My belief that a large majority of the public wishes to support rather than destroy free enterprise is based upon the premise that an informed public will render a fair verdict.

When I say, therefore, that our record will win public support, I make the statement with reservations. I am not so naive as to believe that an industry can win public support by pointing to past achievements any more than I believe that a good fighter can win and hold public acclaim by the simple expedient of displaying his championship belt when he enters the ring. Even a champion loses favor when he ceases to wage a good fight.

Nor do I base my statement that the public is ready to support free enterprise in the public utility field upon encouraging signs along the Potomac. There is indication that the present administration wants to be fair. We do not ask for more.

Record Without Parallel

Our industry's record of achievement is without parallel in America or even in the world. Our performance during World War II was remarkable. Our record in bringing down the price of service, while improving its quality and at a time when the price of practically all other goods and services was going up, is one which should bring praise to the industry. Our contribution toward making electricity available to more than 95 per cent of all the farm homes in America deserves a greater share of credit than some agencies are willing to admit. The ease with which the industry has financed the greatest program of expansion ever undertaken by any industry is evidence of the faith which the American public has in our industry to continue its record of performance.



LOUIS V. SUTTON

Certainly a review of our record would lead to no other conclusion than that the industry which made that record deserves public support. Surveys indicate that more people favor private ownership in the operation of utilities than favor public ownership. Deserving public support, however, does not necessarily mean that we will win it. Indeed there are those whose selfish interests have been served by the new philosophy and who refuse to recognize socialistic road signs. There are those who are not concerned with political and economic philosophy. Their complacency serves the advantage of the demagogue.

Certainly my belief that our record will win public support is not based upon a slackening of effort on the part of the public power group, which, with its predecessors, was responsible for the sale last year of the greatest number of kilowatthours of electricity from public power projects during any year in the history of the industry. Why, then, do I find encouragement? First, there seems to be a growing tendency on the part of the industry to fight for its rights and tell its story to the public. That tendency, though encouraging, is not as prevalent as it should be and as, I am confident, it will be.

I do not take too much encouragement from the growth in the number of companies supporting our associations and agencies, but rather in the change of attitude of those companies which have banded themselves together in the industry's behalf. It is regrettable that so large a number of companies do not feel that the fight against socialization is an industry fight. It is understandable that a company that is not confronted with immediate government threat sees no reason to join hands with those companies which have been and still are fighting for their very existence. I sincerely hope that the threat may spread no farther, but I firmly believe that the industry as a whole is more united today than it would have been had the government confined its interest in public power to the Tennessee Valley.

Appeal More Widespread

My appeal is for more widespread support of the agencies devoted to fighting the industry's battles. No doubt there is good and sufficient reason in the minds of those who do not support the industry's effort at the national level for believing that their company's best interest can be served by confining their efforts to their own service area. I do not share that belief. Action which threatened the socialization of our industry was taken at the national level. The progress made by the public power movement could not have been achieved if its fight has been waged on a state or regional level. If we win the fight against public ownership of our industry, it will be won at the national level.

I am, of course, not assuming that public relations is not of great importance to the individual operating company. The very fact that public relations is important to the individual company accounts for the statement that the movement to socialize the electric utility industry could not have been accomplished at the state level. Your representatives in Con-

gress would stoutly oppose a measure which might affect your company adversely, but support a measure which might put the government in the power business in some other section of the country.

Most utility operating companies are aware of the necessity of creating and maintaining good public relations. I feel, however, there is need for intensifying our efforts. The direction of a utility public relations program is, in my opinion, a job for top management. Some of us too often delegate too much of that responsibility to others.

Public Relations Methods

While on this subject, I might add that there are various methods of promoting good public relations. Basic among them is the careful screening of new employees and the pursuance of a continuous program of employee training and education. Other activities include newsworthy releases to the press, personal contacts with thought leaders, acquainting the public with the various services we perform, calling attention to the amount of money we pay in taxes compared with the salaries and dividends we pay, hard-hitting sales programs, actively promoting community and area development, as well as the elimination where possible of any program or practice which may serve as an irritant.

Some of us, I am sure, have reasoned that the best way to win friends and influence people is to dodge controversy. In my opinion, no company deserves public support which refuses to fight for its very existence. No company can long command public respect which refuses to defend itself. I am inclined to believe that timidity is in some degree responsible for many of our difficulties. True enough, no company wants to incur enmity by a display of belligerance. It is equally true that there is a limit to which a company may retreat and maintain public respect.

Experience with Threats

Experience which we have undergone during the past twenty years should teach us to recognize threats against our industry for what they are. It is a fact also that the public is beginning to see through the schemes which public power advocates use to camouflage their socialistic designs. Certainly the public power schemers had a clear-cut understanding of their ultimate aims when the first bill to create the TVA was introduced in Congress in 1924. As a matter of fact, that bill, and some of the others introduced during the nine succeeding years before TVA became a reality, openly sought to put the Federal government in the electric power business in the Tennessee Valley.

The late Senator George Norris, the so-called father of the TVA, doubted that an act to create a public power authority would be constitutional. He also stated that the thinking of members of Congress was such during those years that an outright attempt to put the Federal government in the power business might not be acceptable. The Senator is credited with saying, therefore, that "it is important to hang the TVA idea on navigation and flood control and that navigation and flood control be made important in the minds of the public." From that time on, the generation of electric power was mentioned only as incidental to the newly announced purposes.

Deceit and Subterfuge

It becomes more and more apparent when reviewing the record that the TVA was conceived in deceit and subterfuge. Immediately prior to the act which created it in 1933, during discussions on the matter of whether or not TVA would be taxed, Senator Norris said, "Senators must understand that if the TVA is taxed on the same basis as companies, it would be out of business in three months." That statement proves that the TVA could not possibly have been intended as a yardstick by which the operations of taxpaying companies could be measured, yet TVA was paraded before the American people as such.

I could devote the remainder of the time alloted to me here to a discussion of TVA's record. Its cost has grown from the initial estimate of $310 million to a present total of $1,905,000,000. Although assurance was given the Congress that the money invested in TVA would be returned to the Federal treasury in 25 years, total repayments through last year amounted to only $87 million or less than 75 per cent of the $120 million appropriated to TVA this year. By no stretch of any businessman's imagination can it be claimed that TVA has been an economic success.

As to the claims that TVA has improved the general economy of the Valley area, we need only to review authentic economic indicators to prove that the State of Tennessee has actually lost position among the eleven Southeastern states since 1933.

Louis B. Wehle, a personal friend and advisor of Franklin D. Roosevelt, gives a startling appraisal of TVA in his book entitled "Hidden Threads of History." He exposes behind-the-scenes activities which led to the amending of the United States Judicial Code in order to put TVA in business. He deplores the fact that the United States Supreme Court, then constituted largely by Roosevelt appointments, refused to consider the constitutionality of the TVA. It is a sickening exposé and represents one of the blackest chapters in the history of American jurisprudence.

TVA Purpose Accomplished

Gordon Clapp, ex-Chairman of TVA, admitted that the stated purposes of TVA were accomplished in 1945 and that its expansion since that time has been related solely to its continuing development as a public power agency. Prior to Mr. Clapp's statement, the admission was made that TVA, Bonneville, Grand Coulee, and all the other so-called Federally financed flood control projects were in reality attempts to socialize the electric utility industry. That admission was made in 1942 in a petition for a rehearing involving the South Carolina Public Service Authority before the Supreme Court of the State of South Carolina. Incidentally, that authority, better known as the Santee-Cooper project, is in a state of economic chaos and is being investigated by a committee appointed by the South Carolina Legislature.

Outright Public Power Proposal

Public power proponents do not even bother to mention navigation and flood control in their attempts to gain congressional approval for the Niagara development. It is an outright public power proposal. The same situation is virtually true of the Hells Canyon proposal. Not only has the Idaho Power Co. proposed a more sensible plan for developing Snake River, but the Idaho plan would cost only a fraction of the estimated cost projected by public power advocates. The Council of State Chambers of Commerce in a report on May 28, 1955, said the proposed Federal government

Hells Canyon Dam on the Snake River would be "the biggest step taken toward socializing electric power in the United States since the Federal monopolization of power in the TVA area."

I will not further belabor this point. I cite it for two purposes: first, to emphasize the fact that the public officials with socialistic tendencies no longer take the trouble to hide their plans behind a smoke screen of laudable purposes; next, to emphasize the fact that the record our industry has achieved, however magnificent, will not win public support unless we batten down the hatches and sail full speed ahead with blazing guns. Those who would destroy us are not puling their punches—why should we? As a matter of fact, when one attempt fails they devise a new plan.

Socializing Agencies Increasing

I am informed on good authority that the number of agencies devoted to socializing our industry is increasing. Their lobbies in Washington are becoming more and more active. The Clerk of the House of Representatives in Washington reported early this month that the National Rural Electric Cooperative Association, headed by ex-Congressman Clyde Ellis from Arkansas, spent more money during the first three months this year "in connection with its legislative interests" than any other agency in the long list of registered lobbyists. I need not enlarge upon the effectiveness of the organization which that association has built up in most of the states throughout the nation. It is unfortunate that this particular organization is making farmers, the very backbone of our free enterprise system, innocent victims of its scheme to socialize the electric utility industry.

Another and relatively new organization headed by Leland Olds is Energy Research Associates, Inc. This organization likes to refer to itself as the "Poor Man's Brookings" and usually shows up in company with such groups as the Public Affairs Institute, the CIO, the National Rural Electric Cooperatives Association, the International Brotherhood of Paper Makers, Municipal Electric Utilities Association, United Gas Coke and Chemical Works, National Farmers Union, The American Public Power Association, and the Electric Consumers League.

The purpose of the organization as publicly stated is to "support the consumer" in the battle between public and private interests. With such names as Leland Olds, Stephen Raushenbush, Morris L. Cook, Alex Radin, and others of similar leanings who hold official position with the various organizations, I need not tell you that we are confronted with experts in the matter of advancing the cause of socialism.

Private New York Meeting

The New York *Post* reported on February 4 of this year that Governor Harriman of New York met privately with representatives of 12 groups and exchanged views on "low cost electricity." Alex Radin, general manager of the American Public Power Association, told Harriman of his "grave concern" over the possible unfair distribution of power by the State Power Authority headed by Robert Moses.

Moses, incidentally, recently received a lesson in socialism from the foremost U. S. Authority Norman Thomas. While Mr. Thomas, father of U. S. Socialists, complimented Mr. Moses on his plan to grab the valuable Niagara Falls power site from the five electric companies in the area willing to make the investment, he chided Mr. Moses for denying that state development of Niagara power would be socialism.

Mr. Thomas, not unwilling to give Mr. Moses the benefit of the doubt, stated in a recent Newark *Star-Ledger* column: ". . . . the advocacy of public power does not of itself make a socialist, or the practice of it constitute a full program of socialism. But, of course, the principle behind public development of power is socialistic, and it is rather childish to deny it." Mr. Thomas urged public power advocates like Mr. Moses to feel free to call their projects socialism. This is the same Norman Thomas, it will be recalled, who referred to TVA as "the one socialistic flower in a garden of capitalistic weeds."

Governmental Monopoly

Recently Secretary McKay of the Interior Department denounced government monopoly as the most dangerous and destructive of all monopolies. He said: "In other parts of the world today this philosophy of government monopoly has created a living nightmare for hundreds of millions of unfortunate people." In the same speech, the Secretary said that one of of the great conflicts of the present lies between the philosophy which supports ownership and development of our natural resources in the traditional American way and one which "presses constantly for expansion of an all - powerful Federal bureaucracy . . ."

There is no greater enemy of freedom than all-powerful government — and no greater friend of slavery.

Andre Vishinsky, former Russian Foreign Minister, might not have agreed with Mr. McKay's appraisal of the fruits of government monopoly, but he was familiar with the procedure which the Kremlin has followed in subjugating almost half the world's population. In a statement made earlier this year he said, "We do not fear the H-bomb. We do not need to conquer the world that way. We have a philosophy, and a program, and a passion."

Two American Philosophies

We in America seem to have two philosophies. One is aimed at preserving our free competitive enterprise system which has made our country great, and the other toward bringing business and industry under the direct control of an all-powerful government. But what about our program, and do we pursue it with a passion? Can it be said that those of us who are interested in the preservation of our free enterprise system are as dedicated to our program as are those who would destroy it?

The record on that subject is not as encouraging as it might be, especially as it relates to the electric utility industry. A recent survey made by the Public Utilities Advertising Association indicates that the electric utility companies across the nation are spending only 62/100 of one per cent of gross revenues for advertising. Only 53 per cent of the companies covered by the survey are spending as much as one dollar per customer per year to tell the grandest story that can be told by any industry in America today. In the past five years gas companies have increased their advertising expenditures per customer at a rate more than double the increase by electric and combination utilities.

Surveys of advertising expenditures by all types of industry usually place the manufacturers of soap, automobiles, cigarettes, and razor blades among the top ten. The electric utility industry, if listed at all, is near the bottom.

As an industry, we are entirely too miserly when it comes to telling our

story; yet no other industry is being besieged by so many destructive forces. What's the use of having a good story if we don't tell it? We don't need to exaggerate or make groundless claims. All we need to do is present facts based upon our record of achievement. Certainly that record justifies public support but can we say we are making adequate effort to gain it?

"Truth Shall Make You Free"

Writing in the May, 1955, issue of *Nation's Business* on the Biblical injunction, "Ye shall know the truth and the truth shall make you free," Felix Morely said, "The suggestion is that an uninformed people must be an enslaved people." This doctrine, Morely went on to say, has never been accepted universally. A number of Americans unconsciously flatter communism by agreeing with the Kremlin that when the truth is disagreeable, or disturbing, it should be officially suppressed.

Such a viewpoint is logical in Russia, where individual freedom has never been much admired, or strongly desired. But it is highly illogical in our country, which as a whole has always approved George Washington's famous assertion: "In proportion as the structure of a government gives force to public opinion, it is essential that public opinion should be enlightened."

Although Morely was relating that passage of scripture to government, it applies equally well to the electric utility industry. Unless the public can know the truth about our record of achievement, we need not be surprised if we are regarded with suspicion.

Dignifying Falsehoods

I have often heard that once a falsehood is advanced, more statements of an even more fantastic nature are required to give it an air of respectability. Our enemies are spending multiplied millions annually in the pursuance of that procedure. We are fortunate that truth serves our advantage.

Not long ago an editorial appeared in the Morgantown, West Virginia, *Post*, which I quote in part. "The Tennessee Legislature made an appropriation of $50,000 the other day which should be of interest to the residents of every state in the union. This $50,000, to put it bluntly, is to be used for lobbying activity on behalf of the Tennessee Valley Authority — and more particularly to get the maximum Federal benefits for the TVA territory.

"It would be equally proper, we suppose, for the legislatures of other states to make similar appropriations to be used for lobbying activity to prevent their being put at any further disadvantage to the TVA states through Federal subsidization of industry in those states."

The fact that the Tennessee Legislature has seen fit to appropriate funds to promote the TVA emphasizes the extent to which the minds of its members have been poisoned by socialism. The action would not have been taken had it not been felt that the record of performance achieved by the electric utility industry was making it more difficult for public agencies to attract government subsidies.

Nation at Crossroads

More encouragement may be taken from statements made by the very liberal U. S. Senator Lister Hill from Alabama before the annual convention of the American Public Power Association in Jacksonville, Fla., on May 3:

"The nation stands today at a crossroad. We are engaged in a colossal struggle to prevent private monopoly from dominating the energy of our civilization.

"If we follow the road down which the country has been diverted since 1953, with Purcell Smith and his power company lobbyists and propagandists setting the signposts, the end of the road will be subservience to a huge energy monopoly.

"But, if we follow the road marked by signposts set up by the great conservationists in the reclamation laws, the Federal Power Act, the Boulder Canyon Act, the Tennessee Valley Authority Act, and the other laws controlling our river basin programs, if in entering the age of atomic power we do not deviate from that road, the end will be ever greater freedom, economic as well as political.

"I am confident that the American people are beginning to awaken to the fact that we have come dangerously near to taking the wrong turn."

Senator Hill was speaking out against the taxpaying, business-managed electric utility industry, but it is interesting to note that he places the fight at the crossroads. He is in effect saying that the public power movement can be throttled. I am strongly of the opinion it can be, if we emphasize to the public the fact that governmental power enterprises have not measured up to their extravagant claims, that they cost far more than originally predicted, that they are not making payments back to the public treasury as promised, that they are not in reality projects to accomplish worthwhile public purposes, that they threaten our American economic freedom and individual liberty.

British Elections

We may take more than a little encouragement also from the recent election in England. The decisive defeat of the Labor Party furnished ample evidence that Britain is tired of the empty promises of the socialists. Confronted by no national emergency, the people expressed themselves definitely against the state as arbiter of the national welfare.

There is encouragement, too, in a series of recent advertisements by the Nashville Tennessee Coal Co. in the heart of the Tennessee Valley entitled "The Whipping Boy of America." By way of a summary, those advertisements had this to say:

> "The American electric industry is the wonder of the world in performance. Yet the politicians, for their personal, private benefit, have made that industry a whipping boy for 20 years.
>
> "Let's thank America's electric industry for giving 100 million customers round-the-clock service.
>
> "Let's thank it for providing enough power even in the demanding war and post-war years.
>
> "Let's thank America's electric industry for reducing prices year after year for 73 years—for giving us immensely improved power at prices less than half what they were 25 years ago—and only a tenth of what they were in 1882!
>
> "Let's thank America's electric industry for the taxes it pays. In 1954 this one industry paid taxes amounting to $1,447,000,000."

Stopping Unjust Persecution

"To stop unjust persecution," says the Nashville Coal Co., "the electric industry generally needs only to keep the facts before the public. All of us whose well-being depends on the elec-

(*Continued on page* 255)

Movement of Power

By Philip Sporn
President, American Gas and Electric Company

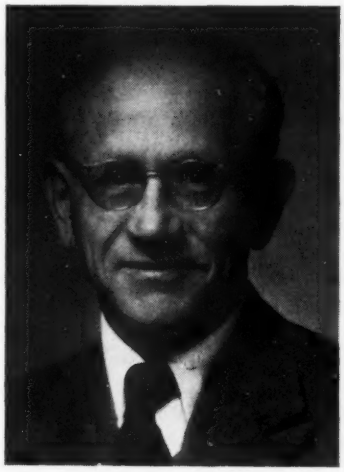
An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 16, 1955

THE purpose of this paper is to present a unified record of developments in electric power transmission, including a projection of work for the future. Exhaustive treatment of such an extensive subject is, of course, not possible here. I shall start with a brief account of early events and a summary of significant achievements from 1900-1945. Appreciation of what transpired up to 1945 requires discussion of the major problems encountered and solved; I shall try to identify these problems. With this background, the more recent progress in 330-kv transmission can be understood and treated. Finally, I shall speak of the role of transmission in the period ahead and what remains to be done if that role is to be fulfilled.

The importance of giving mobility to power was understood abroad long before the beginning of an electrical industry. The art of applying power in industrial operations had its origins in Europe with the industrial revolution there. Since the locus for optimum generation did not necessarily coincide with the locus of use, achievement of mobility was recognized as an indispensable means of utilization or of increasing efficiency. In consequence, more than a century ago, efforts were made in England, France, Germany, and Switzerland to transport power from point of generation to point of use.

Early Transmission Efforts

In these early efforts water under high pressure, compressed air, and wire rope were utilized to move hydraulic power. Distances ranged from a few thousand feet up to miles. But the technology of transmission received revolutionary impetus with the first commercial central power station in 1882, and the perfection of Stanley's alternating current transformer in 1886.



PHILIP SPORN

As the electric power industry grew, the technology of transmission altered and improved. But, whereas growth and improvement in the art of generation has been a fairly continuous process, transmission has followed a less regular course. At times developments in transmission have been spasmodic. In the period of standstill, however, when new work in transmission was negligible, the forces of necessity which ordinarily stimulate invention and pioneering were simply not at work. The flexibility inherent in alternating current transmission, with which we are all familiar, made it possible to carry the greatly enlarged loads at various times with facilities built and developed for smaller system loads.

Yet this flexibility has its limits. With load and system expansion expected to increase four to five times in the next 25 years, it is more than ever important that what has been accomplished in the past be used to take bearings on where we stand and to try to project a sound course ahead. Only in this way will we be able to avoid serious obstacles to the healthy growth of the industry.

The early pioneering in transmission occurred when the industries were beginning to use more and more power, but were prevented from using attractive water power resources because power could not be moved an appreciable distance. An example of the urge to give power mobility during the decade 1880-1890 was the flood of proposals for large-scale development at Niagara Falls and the realization that the value of the power would be immeasurably increased if some way could be found to carry it the 22 miles to Buffalo. In 1887 the City of Buffalo offered a prize of $100,000 for the best transmission scheme. None of the mechanical systems proposed, most of which were based upon European installations, was acceptable and no award was made. In 1886 at Great Barrington, Mass., Stanley had already carried single-phase power 4000 ft, with a transformer stepping up to 3000 v at the source and stepping down again to 500 v at the load. But this was too new and electric transmission was not yet recognized as the only answer to the Niagara problem.

International Niagara Commission

The International Niagara Commission, organized in 1890, fared no better. Its organizer was Edward Dean Adams, president of Cataract Construction Co. (which later became Niagara Power Co.), and the Commission included among its five members the famous Lord Kelvin. The Commission invited leading manufacturers and scientists to submit proposals for a 125,000 hp development and transmission to Buffalo. By 1891 seventeen proposals had been made but none were considered adequate without radical changes and so, although a number of prizes were awarded, no first prize was given.

Meanwhile other projects for moving hydro power were getting under

way elsewhere, particularly on the Pacific Coast. In 1890, 480 kw of single-phase power at 4000 v and 125 cycles was carried 14 miles from Willamette River Falls to Portland, Ore. In 1892, single-phase power generated at San Antonio Canyon, Calif., was stepped up to 10,000 v and carried 14 miles to Pomona, marking the first commercial use of step-up transformers.

Based on these developments and demonstrations, the directors of Niagara Power Co. selected a-c transmission in 1893 for the Niagara-Buffalo project. And in 1896 that company completed the first 11,000-v, 25-cycle transmission line over the 22-mile distance. In 1898 there was also placed into service the 30,000-v, three-phase, 75-mile line from Santa Ana Canyon to Los Angeles and, in 1899, the 40,000-v, 70-mile line from Colgate Hydro to Sacramento. Thus the decade 1890-1900 saw major progress in the development of electric transmission.

Significant Achievements 1900-1920

At the turn of the century electric power transmission was firmly established and progress from then on was rapid. Using pin-type porcelain insulators, voltages were increased to 60 kv by Pacific Gas and Electric Co. in building a 150-mile line from Colgate to Oakland in 1902. During the next five years, many more lines were constructed at this voltage by Pacific Gas and Electric Co. and Edison Electric Co., both in California. The Edison line, built in 1907, extended 117 miles from Kern River to Los Angeles. By 1910, Pacific Gas and Electric had in operation over 1000 miles of 60-kv lines, serving some 150 communities from 11 generating stations with a load totaling 100,000 kw.

Maximum transmission voltage was unchanged from 1902 to 1908 because of the limitation of the pin-type insulators in use at that time. But in 1907 Hewlett and Buck developed the first suspension-type insulators and made possible a break through to higher voltages. In 1908 Grand Rapids Power Co. in Michigan, using the new insulators, pioneered a 110-kv line which ran 50 miles from Grand Rapids to Muskegon. Other lines in this voltage class soon followed. Central Colorado Power Co. built a notable 100-kv, 150-mile line over Argentine Pass. Because of the high altitude, 13,600 ft, and the small 1/0 copper conductor size with resulting corona loss, this line was limited in its operation to 95 kv.

During the next decade voltages were raised to 140 kv. In 1912 Ausable Electric Co. constructed a 125-mile line of that voltage from the Cook Plant on the Ausable River to Flint, Mich. The following year Pacific Light and Power Corp. boosted the level to 150 kv. That company, which later became Southern California Edison, built its 240-mile, 150-kv line consisting of two single-circuit towers from Big Creek to Los Angeles. Many other lines in the 110 to the 132-kv class were constructed during the 1910-1920 period. By 1920 the mileage of these lines throughout the country was very extensive.

Later Developments, 1920-1945

At the same time that lines at voltages up to 150 kv were being installed, studies were proceeding for 220-kv transmission among several groups, including Southern California Edison, Pacific Gas and Electric, and Electric Bond and Share. The Southern California Edison project involved the conversion of the Big Creek 240-mile line from 150 kv to 220 kv. In preparation, a 27-mile section was isolated, grading shields were added, and tests were made at 241 and 284 kv to determine corona performance, charging kva, and general feasibility of using the existing towers and insulators. Corona losses on the 0.96 in. diameter conductor energized at 278 kv, measured from 15 to 45 kw per mile depending upon weather, and agreed quite closely with calculated values using Peek's formulas. Charging current values were found to be 7½ per cent higher than calculated. Corona loss at 241 kv was negligible in clear weather and only about 3 kw per mile in rain. Using auto-transformers for step-up and step-down between 150 kv and 220 kv, the actual cut-over of the line to 220 kv was completed on May 6, 1923, marking the first operation of a transmission line at this voltage anywhere in the world.

Following inauguration of 220-kv operation in California, Pennsylvania Power and Light undertook a similar project linking Wallenpaupack Hydro with the Siegfried Station near Allentown. It was subsequently extended to Plymouth Meeting at Philadelphia, the receiving end of Philadelphia Electric's Conowingo 220-kv line. An extension was then made from Plymouth Meeting to the Roseland Station of Public Service Electric of New Jersey, and in 1932 from Roseland to Bushkill, a tap point on the Wallenpaupack-Siegfried line. The construction of these lines over the years 1926-1932 created the three-company Pennsylvania-New Jersey power pool, an event notable in the history of interconnected system operation.

While a considerable mileage of 220 kv had been built before 1935, tremendous expansion was taking place everywhere at lower transmission voltages. In New England, New York State, in a number of Southern states, and in the Pacific Northwest, 110 kv predominated. The American Gas and Electric Co. and others in the Middle Eastern states from Virginia to Illinois built extensive 132-kv systems. Elsewhere, such as in the TVA area, 154 kv was becoming prevalent.

Delivery from Hoover Dam

An important step in perfecting still higher voltage was the project undertaken in the early '30's by the Department of Water and Power, City of Los Angeles. The problem posed there was the delivery of power from Hoover Dam to Los Angeles, a distance of 270 miles. Investigation of this project and the design of the transmission system involved study and research in corona performance and investigations of various types and sizes of conductors, at various voltage levels and under varying weather conditions. These investigations were carried out largely at Stanford by Carroll, Cozzens, and Blakeslee. The project also required studies of stability and power limits, which became primary considerations in the final selection of the transmission voltage. An integral part of the investigation was the development of the high-speed, three-cycle circuit breakers for switching, that is for opening (but not reclosing) the line.

My greatly compressed chronological account of the development of transmission is likely to give a de-

ceptive impression of ease of solution of problems along the way. Actually the difficulties were formidable in designing, building, and making operative the right equipment, in learning how to cope with rain, sleet, and lightning, and with such phenomena as corona, arcing, and instability. Sometimes the problems were quite well understood initially but sometimes they were only barely grasped at the start and understanding only came later after much investigation and experimentation.

Although the pioneering work was not uniformly distributed among the utilities, it is amazing how widespread were the areas that over the years were the centers of major advances. Niagara, California, Colorado, Michigan, Ohio, and Pennsylvania are but a few of the regions where significant work was carried out at one stage or another in the history of power transmission. Almost always the pioneering reflected joint effort by utilities and manufacturers working together. Because of the free interchange of information characteristic of the electric utility industry since its beginning, it was possible again and again for utility and manufacturing organizations to build readily on all the experience that had gone before. In the rapid advances in the art, I think no factor has been more important than the easy availability to anyone of all the discoveries made and all the experience integrated by everyone else.

Of the many problems that had to be mastered to bring transmission to the mature stage it had reached by 1945, I have selected ten which impress me as the more important. I want to discuss these and give the highlights of their solution.

1. Insulators

The porcelain suspension insulator of today and the high quality of its performance could not be visualized by the pioneers who were forced to use glass because of the unsatisfactory moisture absorbing characteristics of the early porcelain pin product. But a series of developments led to today's insulator. First came the work of Locke in developing the wet porcelain process, of Hewlett and Buck in inventing the clevis suspension unit, and of Austin and of Ohio Brass on the cap and pin unit. There followed Austin's work on treated sanded surface and the resilient pin to give flexibility in the steel-cement porcelain combination. Continuity of control in every step was promoted by the work of a number of utility engineering organizations which devised testing procedure for insulators before installation and during active life while the line was alive.

Since about 1916 insulators have ceased to be a barrier to advances in transmission, but a great deal of work has been carried out in the interval by manufacturers and utility engineering organizations to produce the refinements which have been needed to keep pace with the requirements of higher voltages. And the job is not yet ended.

2. Lightning

The story of studies of lightning carried out cooperatively by the utilities and the manufacturers during 1925-1955 is a saga in itself. Here it can barely be touched upon.

The studies began 30 years ago at a point not much farther advanced than Franklin's knowledge. By now investigations have covered frequency, amplitude, character, time, rate of rise, current and voltage of lightning; we have explored the lightning characteristics of wood, porcelain, air, and other dielectric media; we have developed remedial devices, including ground wires, counter-poises, expulsion tubes, and ultra-rapid reclosure as well as many other improvements in apparatus. These have virtually removed the destructive menace of lightning. That work still remains to be done is so only because we are still pushing forward the frontiers of the art of transmission itself.

3. Circuit Breakers

Nowhere in the record of power transmission is there a more striking achievement than the developments associated with switching electric circuits and building electric switches. The beginning was the fused Niagara-Buffalo high-voltage lines where fuses were found to be slightly wanting; it led through the PG&E tubs, to the 25-million kva 330-kv breakers installed on the AGE and OVEC systems today capable of carrying a current of 2000 amp, circuit opening in three cycles, and circuit reclosing in 15 cycles after the initiation of a fault.

The steps in between were, of course, manifold. Among the outstanding ones were the idea of an arc-generated gas pressure; the concept of deionization; the idea of speed; the impulse idea to assure adequate clearing of low current faults; and the concept of ultra-rapid reclosing of a circuit breaker.

In all this work the manufacturers and the utilities cooperated. This is particularly true in the case of field testing of circuit breakers. Included among the companies which did pioneering work are Baltimore Gas and Electric, Pennsylvania Water & Power, Commonwealth Edison, Alabama Power, Ohio Power, Pacific Gas and Electric, Bonneville Power Administration, and many more. Through such work the modern breaker was brought into being. Up to now, in this country we have had the disadvantage of accompanying oil. But by a repetition of the kind of program carried through in the past, we should be able to develop a new series of breakers in the future capable of doing the job without oil.

4. Relaying and Ultra-Rapid Reclosing

It took a long time to get general acceptance of the idea that relaying and switching may have more to do with determining how many, and what kind of transmission lines are needed to deliver a specific block of power than size of conductor and many other physical characteristics of transmission facilities. This is not surprising. It was natural to think of a relay as performing the function of giving an impulse to disconnect a line in trouble, and for a breaker to carry out that function upon receipt of the impulse. And, the line having been disconnected, what more natural than to wait until all trouble is cleared up before re-energizing the line? It required a mature art to conceive the idea that the function of a relay-breaker combination is to disconnect the line in trouble, and then reclose it with the minimum possible delay, perhaps so fast that no effect of interruption of the line has taken place. Both the utilities and the manufacturers again played significant parts in perfecting this idea.

Starting with relatively crude devices like selective time-delay relays, there followed numerous balanced schemes for duplicate lines, reverse power schemes and, when need for speed became apparent, instantaneous over-current schemes. There culminated, finally, the thought that what was needed was a differential scheme, the same idea that had proved so successful in the protection of generators and transformers. This was originally proposed in a balanced phase arrangement using carrier current as a pilot. This idea proved unreliable in tests, but Ohio Power adapted the idea by using carrier for comparison of direction of power flow by standard or conventional relays. And by this step, relay time was brought down first to three cycles, later to one cycle; this paved the way for the ultra-rapid reclosure of lines up to 330 kv in a matter of 15 cycles from initiation of fault. This significant development reduces by more than 90 per cent the circuit outages that would otherwise occur; but it is still some distance from perfection. Further refinements are under way, and will undoubtedly lead to improvements as loading of circuits increases with use of higher voltages.

5. Frequency and Load Control

The functioning of modern transmission circuits is dependent on a system of stable frequency control and on load or line regulators. Here results have been achieved by the work of progressive manufacturers, and the cooperation between technicians of many companies, hundreds and even thousands of miles apart. While a great deal of equipment was used in this work, certainly the critical piece was the impedance-bridge type graphic frequency recorder, developed by Leeds & Northrup and first introduced in the load dispatcher's office in 1925. Today normal frequency is considered frequency with a deviation of no more than ±0.10 cycles, absolute time deviation allowance is take as ±3 seconds; and if the frequency is above 60.10 or below 59.90 cycles something is done to restore it to normal value and it is done on the basis of distributing the regulation burden among the systems operating in parallel. Standards of this kind have made possible the successful operation in parallel of such large power groups as the Interconnected Systems Group, which had a combined simultaneous one-hour peak in 1954 of over 35½ million kilowatts.

6. Communication and Carrier Telephony

Carrier telephony, for the past quarter century considered an indispensable item in the operation of transmission networks, had its beginning in work of Tidd, Sindeband, and Milnor, which led to an installation on the system of Atlantic City Electric in 1920. This was followed by commercial sets, and the use of these quickly spread. Their growth was accelerated by the adoption of coupling capacitors and single frequency communication. The success of carrier in communication led to its use in telemetering and in control. Carrier current now supplies a basic demand more reliably than any other means of communication and control for high-voltage networks. Yet because of the crowding of the spectrum, eventually it will be relegated to a feeder role, the principal transmission to be taken over perhaps by a system of micro-wave. In fields other than main communication, however, carrier use seems likely to continue to furnish an indispensable tool in any extensive transmission system.

7. Sleet Detection and Melting

One of the tough problems which has always confronted the operator of a transmission network in the United States is the formation of ice or glaze on conductors. This "sleeting" results from temperature inversion with the surface of the earth below freezing while the upper air is above freezing, permitting precipitation as rain to form ice when it strikes the cold transmission conductors. The mechanical stresses imposed upon towers by icing are dangerous enough. Frequently even greater danger results from the "dancing" or "galloping" of conductors which icing causes.

Improvements in mechanical design rendered structures safe in many cases but did not solve the problem of outage of line. This was tackled very early by methods designed to remove ice. Some of the first efforts in this direction were carried out between Baltimore and Holtwood on the line of Pennsylvania Water and Power, by special generating arrangements that made possible the flow of a heavy reactive current. But such arrangements made the application of this method a limited one. Large interconnected networks gave rise to arrangements for sleet melting by utilizing the voltage of the system for connecting sufficient line in series to give a proper impedance to connect between the system voltage and ground. This means of melting sleet on the 132-kv system of American Gas and Electric has been used since 1938. The same methods were used recently on AGE's 330-kv transmission lines by impressing a voltage of 130,000 v on a section of 330-kv circuit and bringing about a flow of 1450 amp, power of 30,000 kw, and almost 350,000 kvar. One of the great additional steps in fighting ice has been the system of detection of sleet formation by measuring the drop-off in carrier signal strength received over a transmission line as sleet begins to form on it. This work, originally carried out by Langdon and Marquis, has been perfected over the years and is used now on many systems.

Generally in this field, while the technology is adequate to cope with a difficult problem, it is clear that room for further development exists. Perhaps we shall devise a non-sleet-adhering conductor, or other means for repelling moisture.

8. Synchronous Condensers and Static Capacitors

The importance of the reactive or excitation component of an alternating current and of being able to generate this component independently by means of condensers—synchronous or otherwise—was observed very early. Application of equipment to supply the need, however, were relatively slow. The only facilities available for the purpose were rotative machines and these machines themselves presented great difficulties. The combination of high losses, excessive noise, difficulty of ventilation and need of buildings to house the apparatus had adverse effects on the economics of application. In 1913 synchronous condensers were installed in Los Angeles by Southern

California Edison, in 1916 on the Windsor-Canton line of Ohio Power, and in 1919 on the system of Pacific Gas and Electric. But the burden that the synchronous condenser carried with it was not lightened until 1928 and 1929. In 1929 Ohio Power successfully installed a conventional condenser outdoors. An even more significant step had occurred in 1928 when the first two hydrogen-cooled synchronous condensers were installed, one by New England Power at Pawtucket, and the other by Appalachian Electric Power at Turner Substation. These led to a series of such condensers which quickly took advantage of the possibilities of reducing size, noise, losses, cost of installation and maintenance, and improving the reliability inherent in the hydrogen design. These advantages were carried to higher levels by bringing up pressures and simplifying auxiliaries.

And while this progress was being made in rotative machines, new technology for building static capacitors was introduced about 1932 and opened up a new field of application for this apparatus. Here kraft paper and non-flammable dielectric were the keys to cost reductions. The developments were furthered by the work of a number of utility organizations in pushing direct connection of capacitors to high voltage buses, up to 110,000 v. There is no reason why this cannot be carried much farther. The development of the series capacitor which was retarded for a long time by the unavailability of application owing primarily to the relative scarcity of long lines, was opened up in the early part of 1950 by the application in a number of installations on the lines of the Bonneville Power Administration. Thus, the full range of the static capacitor has been explored, and the way paved for its further exploitation in the lines of the future, particularly if more interregional lines of very high voltage are built.

9. Power System Stability

Although the problem of stability —that property of a power system which insures that it will remain in operating equilibrium through normal and abnormal conditions—was encountered in the early '90's, the phenomenon was not appreciated for a long time.

The problem first began to be understood in the 1920's as a result of analyses by Vannevar Bush and later extended by Bush and Booth in their so-called step-by-step method of analysis. This was followed by the significant work of Fortescue, Wagner, Evans, and their colleagues, and by the work of Doherty, Nickle, Park, Jones, Treat, Crary and their coworkers. From this work and that done on a number of utility systems there evolved finally the modern concepts and understanding of the integrated effect on stability of generator, transformer, and transmission line impedance, excitation systems, speed of relaying, speed of clearing lines, speed of reclosing lines after clearing, the effect of condensers, the effect of governing, and the effect of the characteristics of the load served and its protective system. In all of this work, the aim has been clear; to bring about a situation where instability or threatened instability would be no barrier to the maximum utilization of the transmission facilities. We have now achieved a high state of understanding of the problem and while work is not all complete we do know how to design and build with minimum threat of disturbance from stability problems.

10. Corona and Radio Noise

The luminescence, audible noise, and the nature of the ionization within dielectric media due to electro-static stress have been the subject of various opinions and extensive tests dating from the first knowledge of electricity. With later observations came the knowledge that energy waves propagate from discharges caused by overstress. The early investigations of Lichtenberg in the 18th Century were followed by those of scientists of the 19th Century, among them the famous Sir Humphry Davy. They were picked up in the development of the art of movement of power by Tesla and Steinmetz in the 1890's. However, toward the end of the last century, Mershon at Telluride, Colo., was perhaps the first to carry out work on corona and to develop data on loss due to corona. The work of Peek, Whitehead, and Ryan followed in the next 25 years.

Originally corona and the related phenomena were examined only from the standpoint of losses in transmission. With the coming of radio, corona and associated phenomena assumed today's more important aspect as a source of interference. And as corona took on this more important aspect, there also came a better understanding of the role of the insulator and the conductor as a source of interference particularly in inclement weather. Carroll, investigating this problem on the Boulder Dam-Los Angeles line in the middle '30's, had a full appreciation of this. Other important investigations on the subject were carried out in obtaining the basic information for and in design and construction of the American Gas and Electric 330-kv system and of OVEC's 330-kv system. We now know that it is corona and associated radio influence that may become the most important, perhaps the sole obstacle, to free extension of overhead high-voltage lines operating at 330,000 v and above. Work on this subject is by no means completed.

Development of 330-Kv Transmission

In 1946 it became evident that existing transmission voltages, particularly 132 kv and below, would become inadequate within a few years. Higher voltages were necessary to (1) restore flexibility and balance between capacity of individual generator units and transmission circuits, (2) avoid excessive costs and difficulties in securing the multiplicity of rights of way for continued expansion at lower voltages, and (3) reduce the basic cost of transmission.

In our own system a substantial increase in capability could have been attained by adopting either 230 kv or 287 kv, already in use. We concluded, however, that we needed a still higher voltage that would remain adequate for another 30 to 40 years, in other words commensurate with the period served by the then-current voltage. To determine what the new voltage should be, and to arrive at a design in which all pertinent factors would be evaluated, we projected a basic research program, including a full-scale field line

installation. We contemplated investigating corona, lightning performance, radio influence—normally referred to as RI—sleet melting, feasibility of maintenance, and so on. With the wholehearted cooperation of several manufacturers we then set up the Tidd 500-kv test project, including two 1.4-mile, single-circuit, variable spacing steel tower lines, instrumentation, lightning arresters, and step-up transformers with variable taps from 265 to 532 kv. The test program, as described in the literature, provided corona loss and radio influence data at various voltages on many sizes, types, and spacings of conductors under year-round all-weather conditions.

Concurrent Studies

Concurrently with this program, studies were carried out on basic insulation level, line insulation, tower and hardware design, future planning, and transmission economics.

The Tidd tests showed rather early that RI rather than corona loss would dictate conductor diameter, and the economic studies brought out the decided cost advantages of double-circuit lines. Decisive factors in the design, therefore, narrowed down to (1) the highest voltage for which double-circuit construction appeared practicable, (2) a voltage for which the conductor diameter needed for RI would not be excessive for sleet melting or handling, and (3) an insulator string length not excessive for hot-line maintenance.

All considerations led to an initial choice of 315 kv nominal (330 kv maximum) 1.6-in. diameter, 1,272,000 cm expanded ACSR conductor, 18 5¾-in. line insulator units, and a transformer BIL of 1125 kv. Bundled or twin conductors were considered but ruled out at that time because of sleet melting and maintenance considerations.

The first line, a 60-mile section from Sporn Plant to Kanawha River Plant: one circuit on double-circuit towers, was completed and placed into service at 132 kv in 1952. A similar section, 50 miles from Sporn to Muskingum River Plant, completed and placed into service early in 1953, was the first to be stepped up to a voltage of 340 kv, later in October of that year.

Unexpectedly high levels of radio influence, mainly due to excess saturant from conductor filler, along with insufficient care in handling, stringing, etc., made is desirable to cut the line back to 132-kv operation following a short period of testing. An immediate review of the RI situation led to a decision to increase the conductor diameter, particularly for the impending OVEC lines, from 1.6 in. to 1.75 in., giving a greater RI margin. Conductivity was increased about 11 per cent above the old conductor. At the same time, line hardware, sleeves, joints, etc., were rechecked in the laboratory for RI characteristics, modified where necessary, conductor manufacture and handling methods were improved, more rigid inspection procedure was adopted, and both wooden horses and tension equipment were used in stringing new lines to avoid abrasion of conductors. To meet revised RI limits, operating voltage level on the modified 330-kv lines was restricted to 328 kv.

Construction of lines with 1.75-in. conductor was started early in 1954. Today the entire OVEC transmission system, approximately 400 miles of double-circuit lines, is in service at 328 to 330 kv.

RI levels have been about as expected for new lines, but complaints have been negligible, even from locations approaching suburban areas where particular concern was felt.

Use of Auto-Transformers

While the modified conductor was used throughout the OVEC system, some 300 miles of line on the AGE system were too far along with 1.6-in. conductor to make the change. It was, therefore, decided that these lines, Tanners Creek to Fort Wayne, to East Lima, to Muskingum River, would be completed and operated at 290 to 300 kv initially by means of auto-transformers at Tanners Creek and Muskingum River where the loop closes on 1.75-in. conductor. Two 400-mva auto-transformers were ordered for this purpose. It is expected they can be dispensed with later at these locations, as conductor aging results in RI improvement. The auto-transformers may then be used as "aging" transformers elsewhere.

An encouraging experience occurred this spring when the original Sporn-Kanawha line which had been strung with the same batch of contaminated 1.6-in. conductor that had given trouble in 1953 on the Sporn-Muskingum River line was energized at 330 kv. Apparently conductor aging, even at only 132-kv operation, was sufficiently effective to bring 330-kv RI to satisfactory levels. Hence this line was left in permanent operation at 330 kv.

Altogether, there are now in service at 330 kv some 400 miles of double-circuit lines on the OVEC system and 260 miles on the AGE system. AGE has another 230 miles still under construction.

Operating experience to date has been good, although lightning flashovers have somewhat exceeded predictions. During a severe sleet season, ice was melted successfully on one 330-kv line section. On another section where melting current is not yet available dancing conductors caused a rather prolonged outage, thus emphasizing the importance of sleet melting procedure on 330-kv lines.

Looking Ahead

In the light of the rate of growth of utility loads, and the coming quadrupling of these loads over the next 20-25 years, the increase in the size of generating units being developed to meet that growth, there is an urgent need for the utilities to plan for greatly increased capacity for power transmission.

How well 330 kv can meet this future challenge may be judged by considering the capability of a typical 135-mile line. For this distance and assuming eventual operation, after conductor aging, at 345 kv, loadings of 500 mw on one circuit or 1000 mw on a double-circuit line are feasible. In the short period of service that 330 kv has had on AGE and OVEC systems, integrated loadings of 350 mw per circuit have actually taken place. And if a twin-conductor, double-circuit design should be adopted — an attractive possibility from the standpoint of resistance to conductor "dancing" and from the standpoint of RI characteristics—these capabilities would be increased by at least 25 per cent to 625 mw and 1250 mw respectively.

This is more than eight times the capacity of existing double-circuit 132-kv lines.

Such capabilities offer savings so high in the avoidance of future inadequacies of service and are, therefore, so important that the larger investment in high-voltage lines today can be an act of prudence. Taking such action will in the end serve best everyone concerned, including consumers and investors.

Developing Higher Voltages

It seems to me it is of the utmost importance that we start to develop the higher voltage networks now. But to start a new voltage on any power system involves initially large capital outlay. The engineers, charged with responsibility of developing systems at minimum costs, naturally hesitate before taking such an ambitious step. They look to management to tell them to go ahead and do it; management on its part looks to the technicians; old voltages tend to be continued when new ones ought to be initiated.

Now, however, we have reached a stage on many systems where the facts are so clear that management and technicians together should be able to discern that higher voltages are essential. This is a time, in short, when it is the job of management to give the engineers a policy that will enable the technicians to begin to plan, to build, and to operate the transmission that will be needed tomorrow and in the years ahead.

Step-Up Requirements

The step-up is not going to be easy. We need to bring along personnel; we need to carry out further laboratory investigations and develop further our technique of actual installation. If the utilities of the country can become convinced of the operating urgency to bring about, and of the economies inherent in, the future movement of power at higher voltages, then enough will have been done to be able to make the start now and many of the detailed plans and the detailed developments can be worked out as we go along to generally bring movement of power at much higher voltages into a reality.

If we do not make that start now, we risk foreclosing the route that will be best in the long run both from a technical and an economic standpoint; we run the risk of finding ourselves overcrowded for space because of the proliferation of lines that lower voltages require and with no space available for the much more effective users of space that high-voltage lines in fact are.

Industry's Response to Nuclear Power

(*Continued from page* 240)

work is proceeding on a 100,000-kw nuclear power plant.

What About the Future?

I have attempted to outline for you some of the things that private industry has done and is proposing to do. Nearly all of the developments that have taken place this year are the result of modifying the Atomic Energy Act to permit private participation. While it is abundantly clear that there has been a sharp upswing in private activity since passage of the new law, in my opinion this is just the beginning. From this point forward we can expect this upswing to become more pronounced as more and more companies are able to assess their proper role in this business.

Latest Statistics

As I mentioned earlier, the latest statistics available indicated that there were 71 organizations participating in study agreements with AEC. Such agreements called for a commitment on the part of each group concerned to spend at least $100,000 on the study. Many companies were reluctant to commit such a sum simply to find out where they might fit into the program. In the cases of some electric utilities in relatively low fuel cost areas, it was felt, on the basis of unclassified information, that the near-term prospects for using nuclear fuels were not sufficiently attractive to justify spending such an amount.

Since publication of these statistics, AEC has issued new regulations covering access to classified technology. The new access agreements involve only minor expenditures which almost any interested company can justify making. I believe that this step on the part of AEC is a most important one which will pay big dividends in the future. It is my understanding that approximately 70 companies had taken advantage of this new arrangement by May 31st. As more companies gain access to nuclear technology, and are thus able to bring their particular skills and abilities to bear on the problems involved, the inevitable result must be a more rapid and more thorough solution of those problems.

Ever-Increasing Use

As for the electric utility industry, I think that through the courageous efforts of some of our colleagues our industry already has demonstrated that we are not going to wait to build power reactors until the technology has advanced to such a point that nuclear power is as cheap as power from the most modern conventional plants. As nuclear power costs inevitably come down, it is hoped that more utilities, including some in lower fuel cost areas, will be applying for licenses to build reactors in their territories. And when nuclear power costs go down still further, utilities in all parts of the country may be turning to this energy source in constructing additional facilities. Thus, nuclear power should become a dynamic force, coming into ever increasing use as it begins to approach the cost of conventional power in the various areas of the country.

The Greatest Good of All

One of the purposes of the Atomic Energy Act of 1954 is "to encourage widespread participation in the development and utilization of atomic energy for peaceful purposes to the maximum extent consistent with the common defense and security and with the health and safety of the public." I hope you will agree with me that industry is doing an outstanding job of responding to the program provided by the AEC for this purpose. We must be sure that our industry continues to put forth its best efforts to harness the peaceful atom for the greatest good of all.

Is the Federal Government Taking Over the States?

By Dr. George C. S. Benson
President, Claremont Men's College, and Research Director, Commission on Intergovernmental Relations

An Address before the Twenty-third Annual Convention of the Edison Electric Institute, Los Angeles, California, June 16, 1955

THE division of powers between the Federal and state governments in the United States is being re-examined for the first time in history by President Eisenhower's Commission on Intergovernmental Relations. This Commission consists of five congressmen, five senators, and 15 individuals chosen by the President. The latter include five governors, or ex-governors, several administrative officials, and several citizens representative of various walks of life.

The Commission has had almost two years of arduous discussions, of extensive researches, and has been benefited by the advice of many associations and of several task forces in various fields of governmental expenditure. Its report is going to the President at the end of this month and will very shortly be published. I am not at liberty to report any conclusions of the Commission, but I can sketch out some of the problems which the Commission has studied and give some of my personal conclusions.

America has traditionally been proud of its Federal system of government. We have quoted "e pluribus unum," talked of states rights, identified ourselves as Texans or New Yorkers, and have rejoiced in our local differences and our local autonomies. Other countries in the world have copied our most successful Federal system.

Tradition of Individualism

We have viewed it as an important part of the American tradition of individualism. It has meant that more individuals could participate in government, that government could be adapted to the needs of each area, and that political issues could be separated between the levels of government. Above all, it has meant a deconcentration of power which is something that Americans have viewed as very important. We do not want anyone to exercise complete authority over us in religious matters, or in economic matters or in governmental matters.

DR. GEORGE C. S. BENSON

In the last few decades, however, there has been a marked drift away from our traditional Federal system. Although much of it came under the New Deal in the 1930's, it should be noted that other portions of it have come during Republican administrations, including the present one. There seems to be several fundamental reasons for this drift toward centralization.

First, and closely related to each other, are the bad boys of the 20th century—war and taxes. Heavy national expenditures for defense have meant more national taxes. As the national taxes have climbed, state and local taxes have become a smaller proportion of the national income. Increased national taxes have resulted in resistance to state and local taxes. Accordingly, the argument is frequently raised that the national government must undertake a function because the states do not have the money to do it. This sounds absurd when we remember that the national government has a tremendous and increasing indebtedness, whereas the states and localities are often paying off their indebtedness. But it is apparently the case that tax resistance can be overcome in Congress much more readily than in State Legislatures and City Councils. Accordingly, there is some truth to the contention that some states and localities need, or perhaps we should say, find it easier to get national money for important functions of government.

War in itself has in another sense caused centralization. It has created important arguments for the feeling that there is a national interest in many functions of state and local government. The most obvious example is Civil Defense, which clearly is a national problem and yet which certainly must be exerted through state and local governmental machinery. National interest becomes more important in such state and local fields as education when we remember that one of the first responsibilities of all male graduates of public schools is to serve in the Armed Forces of the nation.

Technology's Effect

Second to war and taxes as a basis for the existing drift toward centralization is technology. As aeroplanes fly over numerous states in a few hours, it becomes apparent that even state and local regulation of aircraft must follow a national pattern. Many other examples could be given. A free-moving economy like ours probably has to have most of its economic regulation emanate from the government

which covers the entire free economic area. Otherwise, the possibilities of interstate competition, jealousy, and rivalry keep the regulation from being effective.

Third, the national government has maintained higher administrative standards than the average of state and local governments. It is true that these administrative standards are sometimes applied to ends which may be questioned or may conflict with one another. But there is no doubt that the high salaries paid national officials and the strength of national civil service regulations make many business and professional groups turn to the national government for the performance of a desired activity rather than to the states and localities.

"American Impatience"

Fourth, the major factor in the drift toward centralization can perhaps just be classified as American impatience. We are an energetic race of people and we want to get things done. As we meet in national groups, it is always easier for us to have action through Congress than through action by 48 legislatures. Accordingly many, many good, respectable, even conservative, American citizens press for national action on functions which clearly belong in the state and local picture. If you tax them with this, the answer usually is "Why, of course, I am for decentralization but my field is so important that the national government ought to get into it." It reminds one a bit of the business man or union leader or farmer who thinks free enterprise is wonderful except for the subsidy or tariff or support which helps him. Perhaps it should remind us all of the fact that we think Christianity is fine, but we just can't quite apply it in our own family or personal relationships.

Increases in National Power

We have, then, war and taxes, technological development, national administrative superiority, and just plain American impatience leading us into a rapid increase of national power. We still have a Constitution and a Tenth Amendment, however, so that the increases in national power have had to be pegged to something in the Constitution. Two convenient pegs have served to carry a large mass of additional national authority. They are the interstate commerce clause and the power of the national government to tax and spend for the general welfare. I will discuss the national expenditure power both because our Commission has concerned itself more with the expenditure power and because it is a field in which there is more chance for reallocation of functions.

Congress has vastly extended its control over state and local governments through the grant-in-aid device. Grants as authorized by the present session of Congress will probably total over $3 billion. While this is a relatively small part of a national budget of $65 billion, it is a larger proportion of state and local budgets. If one adds to the Federal $3 billion a required matching amount, usually equal to the grant, we find that Congress is controlling at least 25 per cent of state expenditures. If the requests of various groups of state and local officials and of interested citizen groups are followed, Congress will be determining half of state and local budgets within a few years.

Grants-in-Aid Purposes

Existing grants-in-aid seem to serve different purposes. Since these purposes overlap, no classification is clear-cut. However, it may be well to indicate some of the purposes which have been in the minds of the authors of grant statutes. First, grants may be designed to equalize between states of unequal financial capacity. Second, they may be designed to stimulate state and local governments to particular activities. Third, they may be designed to set a minimum standard of operation in particular fields. Fourth, they may be designed merely to use the state government for administration of a particular national purpose. One can have a lengthy discussion of these types of grants but I don't think it would serve much purpose here. Perhaps it is adequate to say that the major purpose underlying most grants seems to be a desire of the national government to see that a particular type of governmental activity is carried on by the state and local governments in a manner which the national government deems desirable.

There are over 30 grants-in-aid in a wide variety of fields. The largest are in public assistance, where some four major categories of expenditures account for over a billion dollars of national expenditures. The next largest are highway grants, in which several categories of national expenditures account for almost a billion dollars of national money. Then there are a wide variety of smaller grants which include low-cost housing, airports, schools in Federally affected areas, child welfare services, agriculture, and vocational education. In fact, grants are now to be found in all of the more expensive functional fields of state and local government except public safety. Curiously, most European countries have centralized public safety before other fields. What we have left is less centralized.

Grants Have Raised Problems

Many of these grants have served very useful purposes. There is undeniable testimony that they have helped to raise the standard of administration of a number of states and localities in the functional fields where they are found. However, they raise some very difficult problems. Let me outline two or three.

First, most important, but hardest to appraise, is the fundamental question as to how much grants may weaken the authority of the governor and state legislature. Clearly, there must be some of this. If state officials are looking to Washington for half of their financial resources and for conditions governing state expenditure, they will have less reason for paying attention to the governor and legislature. Yet, in all fairness, we must note that those states which have organized themselves to give their governors adequate power have been the ones which are the most resistant to excessive pressure by national granting agencies. In other words, national grants weaken the governor much less if the state gives adequate authority to the governor. Many states have failed to do so.

Budgetary Effect of Grants

Second and next in importance to the effect on state administrative leadership is the budgetary effect of grants-in-aid. In spite of arguments on this point, I believe that grants have had a considerable effect on state budgets and sometimes a distorting effect. They have certainly resulted

in a kind of categorization of state expenditures which many states would not have made on their own and which does not constitute good administration.

A third objection is that grant programs are uncoordinated and result in administrative disintegration within states. It is sometimes the case that national bureaus are far apart from each other in thought, policy, and procedure. The effect of these differences may be multipled as the grants programs filter down to the state level. Opportunity for coordination of state programs is thus weakened by the Federal grants.

These difficulties of grants all, of course, have adverse effect on the fundamental values of our system of governmental decentralization mentioned above. Perhaps grants are better than direct national administration, but the objections remain.

Abolition of Grants Doubtful

In spite of these objections, I am quite well aware that powerful pressures support the entire grants-in-aid program. It is doubtful if any important grants will be abolished in the near future. Probably the best that can be done in the interests of decentralization is to keep new grants from coming on too rapidly. The articulate pressure groups of businessmen or professional groups or labor or farmers which persuade congressmen to vote are almost all *for* particular grants. There is little substantial pressure *against* grants.

Let me now add a few words about the trend to centralization under the other constitutional peg, that of interstate commerce. In general, as a political scientist, I must concede that this other Federal development is more justifiable than the development under the expenditures power. The development has probably been carried too far in such holdings as those that newsboys or elevator operators are engaged in interstate commerce. Statutory interpretations like those in the Phillips case are probably excessive. But it is hard to deny the general proposition that governmental regulatory agencies should cover an area similar to that over which *free* economic movement in the regulated fields is permitted. This is not to say that I approve of all national regulation.

However, much could be done to bring the states into a more fruitful cooperative relationship in this field of governmental regulation. In the regulatory field, as in the expenditures field, some citizens, legislators, and even judges have taken the position that anything the national government *may* do, it *should* do. This is a dangerous doctrine, for under the new court interpretations of the pegs of expenditure and interstate commerce the national government may enter into a very wide variety of activities. The final result is to extend national activity beyond what Washington can reasonably undertake and to restrict state and local policy making with the resultant loss of the advantages of decentralization described earlier.

A better approach would seem to lie in suggesting some degree of moderation on the part of the national government: it need not do everything it can do. Where it must act, it should leave room for cooperative or independent state action. Frequently the national action should lean on state law. Often the cooperative action of state agencies should be requested. The national government should, as in the case of insurance, give the states an opportunity to legislate where this is feasible. It should not try to preempt the legislative power. Reasonable state laws which agree with national laws should be permitted to function. State officials should be consulted more frequently in drafting national regulations.

Regulation By States to Keep States More Vital

I realize that some of these suggestions will sound like more regulation and that many persons in the electric utility field feel that the industry is already over-regulated. I am not altogether unsympathetic with this position, feeling as I do that any kind of competition is better than regulation. But as a political scientist I am sure the American people are going to demand adequate regulation wherever they think there is a monopoly, and it is better in everybody's interest to keep as much of that regulation as is feasible in the hands of state government to keep the states more vital. More vital state institutions will mean more chance for the citizen to participate in government, more opportunity to train political leaders, more opportunity to adjust government to the needs of areas, a better division of political labor, and less concentration of power. These values are certainly worth fighting for.

Industry's Best Interest

There is an interesting result of my reasoning which I am sure will be puzzling. It is that those in the electric industry, as conservative business men, should do all they can to strengthen state and local institutions. Many have not wanted strong state governments in the past. But, paradoxical though it may sound, it is probably to their own best interest in the long run to help to build strong state and local governments. They are the only alternative to more complete Federal controls.

William F. Moses Wins Management Award

WILLIAM F. MOSES, Vice President, Customer and Employee Relations, New Jersey Power & Light Co. has won the annual Award For Merit presented by the Research Institute of America for his "contribution to executive skills."

The Institute, a business research and advisory organization, also awarded a company citation to Hugh C. Thuerk, President of New Jersey Power & Light Co.

The Awards were given jointly to individuals and their companies "for steadily advancing the level of achievement within the framework of their own operations."

Mr. Moses' award-winning entry concerned the preparation and use of a booklet entitled "You're On The Team," designed to welcome new employees, tell them something of the history of the company, the area served, its organization, and the principles which guide it in serving its many customers.

"You're On The Team" is only one phase of a comprehensive indoctrination program for newcomers to New Jersey Power & Light Co.

Formal presenation of the award and citation was made on May 31 by Robert Baker of the Research Institute of America's executive staff.

Competing Agencies of Regulation

(*Continued from page* 221)

bility to grant exemptions, the agency is more likely to fulfill that responsibility than it would be to pay heed to generalized statements of policy. I think giving the Federal agency a voice in granting the exemption is the saving feature.

It may be argued that force of circumstances has compelled the SEC to obey the Congressional mandate; that the task under the Holding Company Act was so great that it was necessary to whittle it down through exemption procedures. It may be argued also that since, under the Holding Company Act, the Federal government was embarking on new and uncharted, and extremely turbulent seas, it was good politics to be over cautious. However, the fact remains that the procedure established by Section 3 compelled the SEC to face squarely and on the record, the Congressional purpose that local systems were not to be tampered with unless the FPC could point to some clearly detrimental condition a State Commission could not correct.

This, then, may be the solution of our problem. By an Act of Congress, the FPC would be required to exempt from its regulatory authority those companies which met the Brandeis concept of a business "essentially local in character." If such an exemption were denied, it would have to be on the basis of a supervening national public interest plainly established on the record after a hearing.

Under such a legislative scheme, it would be possible to provide a truly integrated system of regulation under which there would be rendered to the national government spheres of control supplementary to and consistent with state regulation of local utilities. The scheme would have sufficient flexibility to be adaptable to the changing technology of the industry, but it would be explicit enough in its statutory procedure to compel the attention of the Federal agency to the intent of Congress and to the reality of an increasingly efficient and comprehensive system of state regulation. It would provide a continuing means for adhering to a basic American doctrine of government which President Eisenhower stated with impressive directness when he approved the Hinshaw Amendment to the Natural Gas Act. He said: "I have approved this bill because of my conviction that the interests of the individual citizen will be better protected when they remain under state and local control than when they are controlled by the Federal government."

The debate that brought about such a reform might well be recorded as the last debate on Federal and state control of the power industry. The "Attleboro gap" might become simply a point of interest to political archaeologists and the confusion, antagonisms, and harassments of the 1930's might be relegated to the limbo of forgotten controversies.

Record Will Win Support

(*Continued from page* 244)

tric industry must arise and fight crackpot politicians."

We are grateful to the Nashville Coal Co. for its splendid tribute to our industry, and hope to see a growing trend toward such inter-industry cooperation. We could ask for no better direction than the course it has suggested. We welcome the active help of our friends and those who believe in our cause.

The future of our industry lies in the minds of its management and in the vigor with which we pursue plans which public opinion holds to be right. We can no longer adhere to the old adage regarding the building of a better mouse trap. We have built a record which is unmatched in American industry. That record justifies public support, but to say we will win it presupposes intensified effort on a united front.

Our first job is to operate our businesses as fairly and as soundly as we can. Our second responsibility is to tell and retell the advantages offered by our investor-owned electric light and power industry and our American free enterprise system.

If we wish to maintain our free private enterprise system, we must speak out fearlessly against those who, with phony schemes and dishonest procedures, would lead us to destruction, and we must align ourselves vigorously with those who are trying to preserve our future, and our American way of life.

23rd Annual EEI Convention

(*Continued from page* 200)

President, by Philip D. Reed, Chairman of General Electric Co. An article on the presentation and the winning achievement appears on page 207.

Musical Revue

Following the award ceremony, General Electric presented a star-studded musical revue, "Light Fantastic." Headliners in the show were Dennis Day, Jane Froman, George Gobel, and Ronald Reagan. The zany antics of the Wiere Brothers and the dancing of Bobby Van also contributed to the amusement and entertainment of the convention-goers.

Varied Tours and Activities

Although not part of the Convention's official program, there was a variety of tours and activities which could be arranged through special transportation and information booths set up by the host company. Among them was a visit to the El Segundo plant, Southern California Edison's newest steam-electric generating station, and an inspection of Linda-Lyle Estates, an all-electric community, whose homes include among their equipment built-in color kitchens and heat pumps.

Acknowledgments

At the concluding general session on Thursday, Mr. Quinton expressed "deep appreciation and gratitude 'on behalf of the Institute' to all the many individuals and organizations who so whole-heartedly contributed to the Convention's success." He cited particularly the General Electric Co. for the show "put on especially for us," commenting that "it probably holds the record for the shortest run of any show of top-notch Hollywood or Broadway caliber —it had its gala premiere and its successful closing simultaneously."

Mr. Quinton tendered "sincerest thanks" to the other manufacturers "who did so much to make the Convention an enjoyable and pleasant occasion," and commended *Electrical World* for publishing the Unconventional Daily, "once again giving us a vital channel of communication" covering people and events.

Coffin Award

(*Continued from page 207*)

minum line on this basis, and in 1954, TP&L completed and began operating for the aluminum company a 240,000-kw generating station using processed lignite.

In the citation by the Coffin Award judges, TP&L's lignite work is commended as "nationally recognized to be of benefit to the industry and the public by opening up the potentialities for economic exploitation of the nation's vast and largely undeveloped deposits of lignite and other low-rank, non-coking fuels."

Research in lignite and such by-products as tar, fly-ash, and slag is continuing. The Texas utility noted that the program has developed by-products not even thought of at the time the research was undertaken, and "each by-product may be another stimulant to the industrial growth of Texas."

TP&L's contributions to both the industrial and agricultural development of Texas were praised in the Coffin Award citation. The utility's research into such other resources as clay and iron ore, and its energetic program for attracting new industries to the "Texas Bright Spot," as the company terms its service area, have resulted in the establishment of many new plants.

In the agricultural field, TP&L is carrying on an expanded farm service program, with specialists in the field in direct contact with the farmer and his problems. Research on practical and economical applications of electricity to farm operations is included among projects being carried on in cooperation with educational institutions and other established farm agencies.

Texas Power & Light serves a 52-county area in North, Central, and East Texas totaling 47,200 square miles, comprised mainly of small, rural communities. At the end of 1954, the company had nearly 310,000 customers.

The Texas utility was selected as recipient of the Coffin Award after a nominating panel, representing every section of the nation, had reviewed the accomplishments of operating electric companies in 1954. The winner was chosen by a committee of judges composed of Dr. James R. Killian, Jr., President of Massachusetts Institute of Technology; C. W. Kellogg, Past President of Edison Electric Institute; and President Quinton.

Established 33 years ago by the Charles A. Coffin Award Foundation in honor of General Electric's first president, the Coffin Award consists of a gold medal and $1,000 for the winning company's employee benefit fund. It is presented annually in recognition of outstanding achievements by electric companies contributing to the advance of the industry and service to customers.

CONVENTIONS AND MEETINGS

1955

AUGUST

11-12	Southeastern Electric Exchange, Personnel Administration Section, Roanoke Hotel, Roanoke, Va.
15-19	AIEE Pacific General Meeting, Butte, Mont.

SEPTEMBER

11-14	Rocky Mountain Electrical League Annual Fall Convention, Grand Teton Lodge, Jackson Hole, Wyo.
12-16	IES National Technical Conference, Cleveland, Ohio.
13-14	EEI-AGA Accounting Division Organizational Meetings, Netherland Plaza Hotel, Cincinnati, Ohio.
14	EEI Home Service Committee Meeting, Detroit, Mich.
15-18	Public Utilities Association of the Virginias 37th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va.
19-21	EEI Industrial Relations Round Table Conference, Drake Hotel, Chicago, Ill.
21-23	National Industrial Conference Board Marketing Meeting, Waldorf-Astoria Hotel, New York, N. Y.
22-23	Southeastern Electric Exchange Engineering and Operation Section Meeting, Charlotte Hotel, Charlotte, N. C.
22-23	EEI Industrial Power and Heating Group, EEI Headquarters, New York, N. Y.
22-23	Missouri Valley Electric Association Accounting Conference, President Hotel, Kansas City, Mo.
23	Oklahoma Utilities Association, Meeting of Gas Division, Oklahoma City, Okla.
26	EEI Purchasing and Stores Committee, Planning, EEI Headquarters, New York, N. Y.
29-30	EEI Transmission and Distribution Committee, Jung Hotel, New Orleans, La.

1955

OCTOBER

3- 7	AIEE Fall General Meeting, Morrison Hotel, Chicago, Ill.
3- 5	EEI Meter and Service Committee, Hotel Syracuse, Syracuse, N. Y.
3- 5	EEI Prime Movers Committee, Hotel Cleveland, Cleveland, Ohio.
5- 7	Missouri Valley Electric Association Sales & Rural Conference, President Hotel, Kansas City, Mo.
5- 7	PIP Workshop Conference, Chase-Park Plaza Hotels, St. Louis, Mo.
17-18	EEI Electrical Equipment Committee, Shoreham Hotel, Washington, D. C.
17-19	Joint Meeting AGA 37th Annual Convention and Pacific Coast Gas Association 62nd Annual Convention, Statler, Ambassador and Biltmore Hotels, Los Angeles, Calif.
20	National Industrial Conference Board Meeting of Board Members, Waldorf-Astoria Hotel, New York, N. Y.
20-21	Southeastern Electric Exchange Accounting Conference, Hotel San Carlos, Pensacola, Fla.
21	Oklahoma Utilities Association, Meeting of Accounting Section, Lawton, Okla.
24-27	NARUC 67th Annual Convention, Grove Park Inn, Asheville, N. C.
26-28	National Industrial Conference Board Special Atomic Energy Conference, Waldorf-Astoria Hotel, New York, N. Y.
27-28	PEA Electrical Equipment Committee, Hotel New Yorker, New York, N. Y.
27-28	Southeastern Electric Exchange Sales Conference, Biltmore Hotel, Atlanta, Ga.

EDISON ELECTRIC INSTITUTE OFFICERS AND COMMITTEES

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Customer Collections, A. H. Mayer.....Consolidated Edison Co. of New York, Inc., New York, N. Y.
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Prime Movers, W. L. Chadwick.....Southern California Edison Co., Los Angeles, Calif.
Transmission and Distribution, J. W. Anderson.....Philadelphia Electric Co., Philadelphia, Pa.

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Area Development, W. I. Dolbeare.....Virginia Electric and Power Co., Richmond, Va.
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